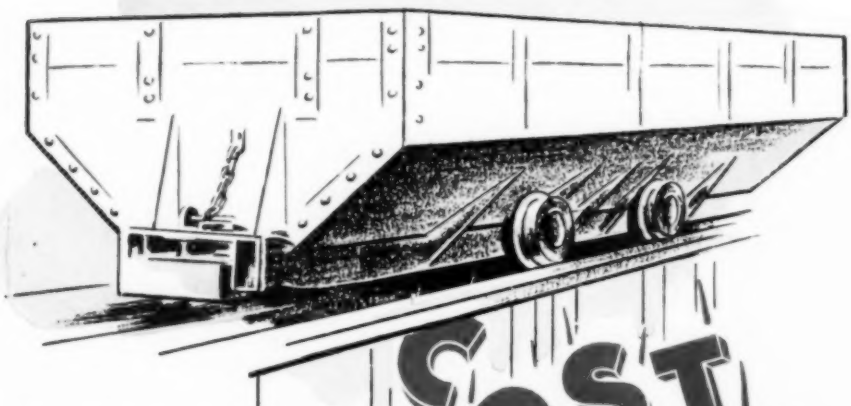
Coal Age

A McGRAW-HILL PUBLICATION JANUARY, 1949

COAL'S NEW ERA p. 58

DROP-BOTTOM CARS



will drop your COSTS

Cut the *idle time* of your loaders. A.C.F. Drop-Bottom Mine Cars eliminate waits and delays at the tipple. 'Lubricated' doors trip-and-unload, close-and-latch *while the trip is in motion!* One company empties a whole 14-car trip of 5-ton A.C.F. cars in just 70 seconds! Speed like that raises loading machine efficiency...lowers haulage costs...increases mine output.

Find out just how much time and money A.C.F. Drop-Bottom Cars can save. Call in our Sales Representative today.

American Car and Foundry Company, New York · Chicago · Cleveland · Washington · Huntington, W. Va. · St. Louis Berwick, Pa. · Pittsburgh · Philadelphia San Francisco

a.C.f. MINE CARS

for Greater Coal Output

Cut V-belt costs 20 to 50% with new B. F. Goodrich grommet V-belt

Lasts longer, stands shock loads better, costs no more

A NEW patented construction by B. F. Goodrich puts all the cord material in a V-belt to work in the form of twin, endless, extra-flexible grommets — *not* cables — placed close to the driving faces of the belt (see left, above). No "lazy" cords in the interior to shirk their share of the load. Because grommets are endless they are more flexible, with no stiff section such as occurs in an ordinary cable, with spliced or overlapped ends.

Why twin grommet construction? When an ordinary large-sized V-belt (right, above) goes into the sheave its sides are squeezed by the pulley, forcing the center cords downward and out of the line of load-carrying stress. Belt men call this "dishing", because the cord section becomes concave, like a dish. With twin grommet construction there are no center cords, no "dishing" — as the belt goes into the pulley the grommets remain on the job, close to the driving surfaces of the belt.

Grommet belts take shock load better, last longer — Laboratory and field tests show that grommet belts have a higher safety factor, greater ability to withstand shock load, than ordinary V-belts. Reasons: no "lost" or "lazy" cords to shirk, greater flexibility, better gripping power. Grommet belts tested lasted from 20 to 50% longer than ordinary V-belts. Reasons: no cord overlaps (85% of ordinary V-belts fail in the overlapped section), no sawing cords, less heat.

How to get genuine grommet V-belts — Twin grommet construction is an exclusive, patented B. F. Goodrich development — no other manufacturer can make grommet V-belts. Now available in "D" and "E" sections. To be sure you get genuine grommet V-belts see your B. F. Goodrich distributor. *The B. F. Goodrich Company, Industrial Products Division, Akron, Ohio.*

B.F. Goodrich
RUBBER FOR INDUSTRY

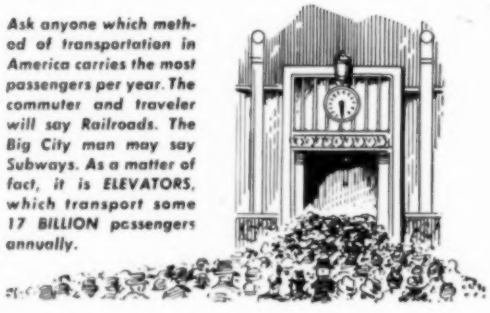
Make no mistake

FOR INSTANCE...

Are you mistaken about

TRANSPORTATION?

Ask anyone which method of transportation in America carries the most passengers per year. The commuter and traveler will say Railroads. The Big City man may say Subways. As a matter of fact, it is ELEVATORS, which transport some 17 BILLION passengers annually.



If there's one thing that carries more responsibility for the trouble-free operation of coal mining machinery than anything else, it's LUBRICATION. That's why it's so important to use exactly the RIGHT lubricant, compounded specifically to do one job right — in three words, HULBURT QUALITY GREASE. Use it, with the advice of HULBURT down-in-your-mine Lubrication Engineers, and you'll soon see the performance-curve of your coal mining machinery GOING UP!

HULBURT OIL & GREASE COMPANY—PHILADELPHIA, PENNA.

Specialists in Coal Mine Lubrication

— for Coal Mine Lubrication

use

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Quality GREASE

PROVEN BY PERFORMANCE

Coal Age

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COAL AGE articles are indexed regularly by Engineering Index, Inc. COAL AGE'S own index published annually may be had on request to the Editorial Department.

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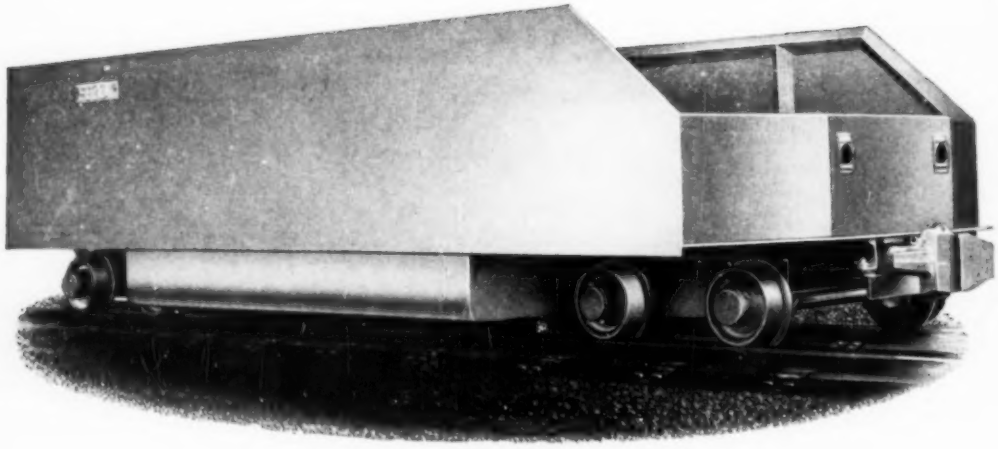
AS MODERN AS TODAY



Here's a Bethlehem all-steel car that's as modern as today's date on your calendar. Strictly up-to-the-minute. From coupler to coupler, it represents the very latest in mine-car development.

Body welded throughout . . . roller-bearing trucks . . . eight forged-steel wheels . . . automatic self-centering couplers . . . these are some of the features embodied in this big, roomy car. It holds 10 tons easily, and it's built to stand up under these loads for years.

If, however, you prefer a smaller type of car, Bethlehem will gladly help you plan it. We are equipped to build end-dump or rotary-dump, high- or low-side cars, and either four- or eight-wheel types can be furnished. Regardless of size, the job will be done to your entire satisfaction.

If you are considering the purchase of new mine cars, it is suggested that you talk with Bethlehem. Our engineers will be glad to co-operate in every way possible.

BETHLEHEM STEEL

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation
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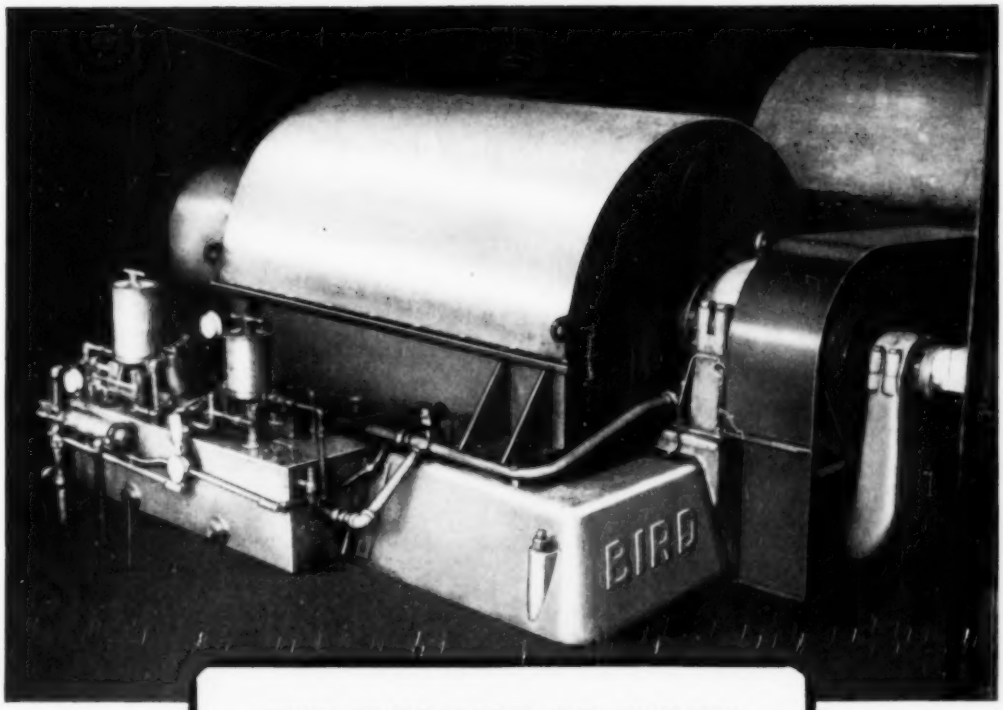


PUT THIS BIRD TO WORK DRYING YOUR FINE COAL

Here's what happens:

The Bird Continuous Centrifugal Filter takes the fine coal from any washing system and delivers it well blended, uniformly dried, without loss of valuable fines.

Its use permits a *closed water system.* Stream pollution is reduced and process water saved.

It does the job continuously for long periods without shutdowns for overhaul or parts replacements, and at such low operating cost that you are justified in replacement of existing drying equipment.

For detailed facts and figures get in touch with

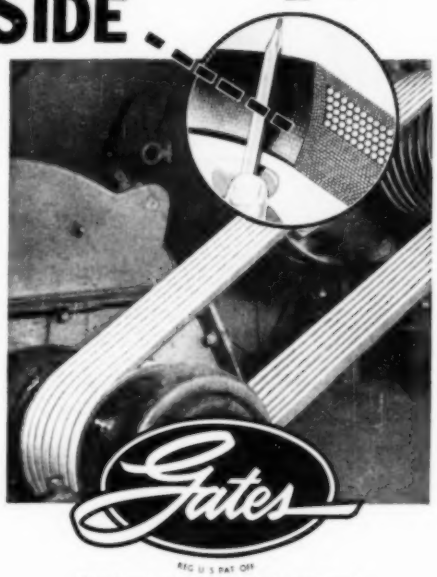
BIRD MACHINE COMPANY
SOUTH WALPOLE • MASSACHUSETTS

Any V-BELT Changes Shape *when it Bends*

Prove this yourself!

That's Why the CONCAVE SIDE...

(U. S. PATENT NO. (813698)



The Mark of SPECIALIZED Research

Gives You 2 Big SAVINGS!

Bend *any* V-Belt and *f e e l* it change shape. The top, under tension, *narrows*. The body, under compression, *widens*. The sides of the belt bulge out.

Straight-Sided V-Belt

Straight-Sided V-Belt Bulges in Sheave-Groove.

The result, if the belt is built with *straight* sides, is a shape that does not fit the sheave groove — as shown in Figures 1 and 1-A, above.

Now, bend the V-Belt built with the precisely engineered Concave Side (U. S. Patent No. 1813698) — the Gates Vulco Rope.

Gates Vulco Rope With Concave Side.

No Side Bulge. Precise Fit in Sheave Groove.

You get the same shape change but *now* the new shape *exactly fits* the sheave groove as shown in Figures 2 and 2-A.

Results— (1) *Uniform* side-wall wear; *longer* life. (2) *Full* side-wall grip on the pulley; carries heavier loads and sudden load increases without slippage — a big increase in drive efficiency—saving belt wear a n d also saving power!

The Concave Side is MORE IMPORTANT NOW Than Ever Before

Because the *sides* of a V-Belt are what actually *drive* the pulley, it is clear that any increased load on the belt means a heavier load that must be transmitted to the pulley *directly* through the belt's side-walls.

Now that Gates *SPECIALIZED* Research has m a d e available to you SUPER Vulco Ropes—carrying fully 40% higher horsepower ratings—the life-prolonging Concave Side naturally delivers greater savings today than ever before.

GATES VULCO ROPE DRIVES

Engineering Offices and Jobber Stocks IN ALL INDUSTRIAL CENTERS of the U. S. and 41 Foreign Countries

THE GATES RUBBER COMPANY
DENVER, U.S.A.
"The World's Largest Makers of V-Belts"

Safety is the feature you look for in all coal mining equipment and accessories. With portable cords and cables the safety angle is paramount. That is why all TIREX Cords and Cables for coal mine service have the marking P-101 molded onto the cured-in-lead Selenium Neoprene Armor.

This marking is your assurance that TIREX Cords and Cables comply with all the requirements of the Department of Mines, Commonwealth of Pennsylvania. It means that the cable will not support combustion.

TIREX was the first rubber-jacketed heavy duty cord or cable in the field. During nearly thirty years it has remained the leader. Simplex-TIREX Cords and Cables are stocked by the many TIREX distributors located throughout the mining areas.

Simplex

WIRES & CABLES

SIMPLEX WIRE & CABLE CO., 79 SIDNEY ST., CAMBRIDGE 39, MASS.

Now! IT'S THE BD-3

A 4th DIESEL MOTOR GRADER JOINS THE ALLIS-CHALMERS LINE*

MOST POWERFUL MOTOR GRADER IN ITS CLASS

78 BRAKE HP. — 19,042 LBS.

2-Cycle GM Diesel Engine

A CONSTRUCTION MACHINE THROUGH AND THROUGH

Handles every type of grading on road or street construction—builds ditches, cuts backslopes, removes sod, shapes up and finishes surface . . . scarifies, mixes blacktop, plows snow.

FAST, HIGHLY MANEUVERABLE

- Six Forward Speeds — 2.21 to 15.58 m.p.h. . . . Three Reverse — 2.64 to 5.74 m.p.h.
- Travel speeds smoothly synchronized with operator controls . . . all the needed power applied as required.
- Easier to steer and maneuver on every type of job — shorter turning radius makes it ideal for narrow roads and streets.

***OTHER ALLIS-CHALMERS DIESEL-POWERED MOTOR GRADERS**

AD-4, 104 Brake hp. . . . 22,140 lbs. AD-3, 78 Brake hp. . . . . 21,835 lbs.
BD-2, 50.5 Brake hp. . . . 17,772 lbs.

COMPLETELY EQUIPPED including electric starter and lights. Available with scarifier, cab and snowplow. Choice of 7:50, 9:00 or 13:00 front tires.

PATTERNED AFTER THE POPULAR MODEL AD MOTOR GRADER

STRONG — exclusive tubular frame . . . absorbs shocks, protects control rods inside frame.

ACCURATE — cuts smoothly, blade held firmly on road through direct down pressure.

HIGH CLEARANCE — 28″ throat clearance for handling bigger windrows without interference.

"ROLL-AWAY" MOLDBOARD — less power required to handle bigger windrows at faster speeds. Material is rolled, not pushed.

FULL CIRCLE REVOLVING BLADE — swings 360° . . . enables operator to grade either forward or reverse.

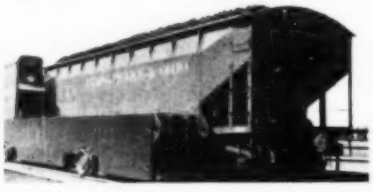
FULL RANGE OF BLADE POSITIONS . . . plus leaning front wheels, for handling all types of grading with ease.

ALLIS-CHALMERS

TRACTOR DIVISION — MILWAUKEE 1, U. S. A.

WHEN BIGGER THINGS WERE DONE FOR COAL-

C&O Did Them... All Along the Line!



C&O stands on its record of down-the-line expansion for coal. Through every phase of railroad operation—from equipment to personnel—C&O has kept pace with the gigantic forward strides of the coal industry. This has been and will continue to be C&O policy in its determination to keep growing with coal.

- Chesapeake and Ohio had on May 1, 1948, 63,455 cars serving the coal industry. More than 5,000 new coal cars were placed in service during the last eight months of 1948.
- C&O had 1,181 *coal-burning* locomotives in service as of July 1, 1948. During the last half of the year, 50 more were delivered.
- The daily coal loading record was broken six times during 1947 and that record has been exceeded seven times in 1948. In the 1947 record year, 1,412,458 cars of coal were loaded by C&O.
- 1550 miles of track make up the principal assembly and classification yards on the C&O. Since 1937, 87 miles of track have been added to these yards. During the last ten years, 529 track miles of CTC service have been installed.
- 42,000 employees are on the job at C&O, most of whom are directly concerned with the efficient movement of coal.

CHESAPEAKE & OHIO RAILWAY

Largest Originating Carrier of Bituminous Coal in the World

HARD ROCK LUG for severest off-the-road service

ROAD LUG for service OFF and ON the road

Super-tough
for pit and quarry service

IT takes something special to do a super job, and that's why Goodyear designed these two special work-horse tires. They're practically custom-built to meet the various needs of pit and quarry hauling. The Hard Rock Lug is the tire for off-the-road duty. The Road Lug the choice for both *on* and *off* the road.

Buy the tires that are *right* for your hauling needs — Goodyear job-proven tires — they provide the *right* answer to long-life operation at lowest-cost per-ton-mile in mine and quarry hauling.

Both the Hard Rock Lug and Road Lug are built with super-strong rayon cord and extra-heavy treads. Each rolls on a tread specially designed for its own type of work. Ask your Goodyear dealer now to recommend the tire that's best for your operation.

We think you'll like "THE GREATEST STORY EVER TOLD" Every Sunday — ABC Network

GOODYEAR

MORE TONS ARE HAULED ON GOODYEAR TRUCK TIRES THAN ON ANY OTHER KIND

Reg. U.S. Pat. Off. The Goodyear Tire & Rubber Company

The **ROCKMASTER** Blasting System Holds Down Costs In Spite of Rising Expenses!

In quarries, mines, stripping operations, and on construction projects the cost of drilling, labor, and supplies has increased—but *over-all* costs have been knocked down through the use of the ROCKMASTER Blasting System!

By switching to ROCKMASTER, one limestone quarry effected a reduction of more than 50% in drilling and dynamite costs! Now, instead of drilling on 4-foot centers, holes are spaced on 8-foot centers—sometimes even greater. Breakage is exceptionally good . . . objectionable noise and vibration has been cut to a minimum. This is not an isolated case! More and more users of explosives are using ROCKMASTER to get better breakage . . . save wear and tear on equipment . . . cut *over-all* costs.

When Atlas pioneered ROCKMASTER, it introduced a new concept of blasting. ROCKMASTER is a blasting *system* based on the right explosive and method of loading . . . the proper spacing of holes . . . the selection of the right millisecond delays—all based on the kind of rock being blasted.

Call in your Atlas representative. He'll be glad to show you how the ROCKMASTER Blasting System can be adapted to *your* job.

"ROCKMASTER"—Trade Mark
Manasite: Reg. U. S. Pat. Off.

ATLAS EXPLOSIVES
"Everything for Blasting"

CHEMICALS ATLAS EXPLOSIVES

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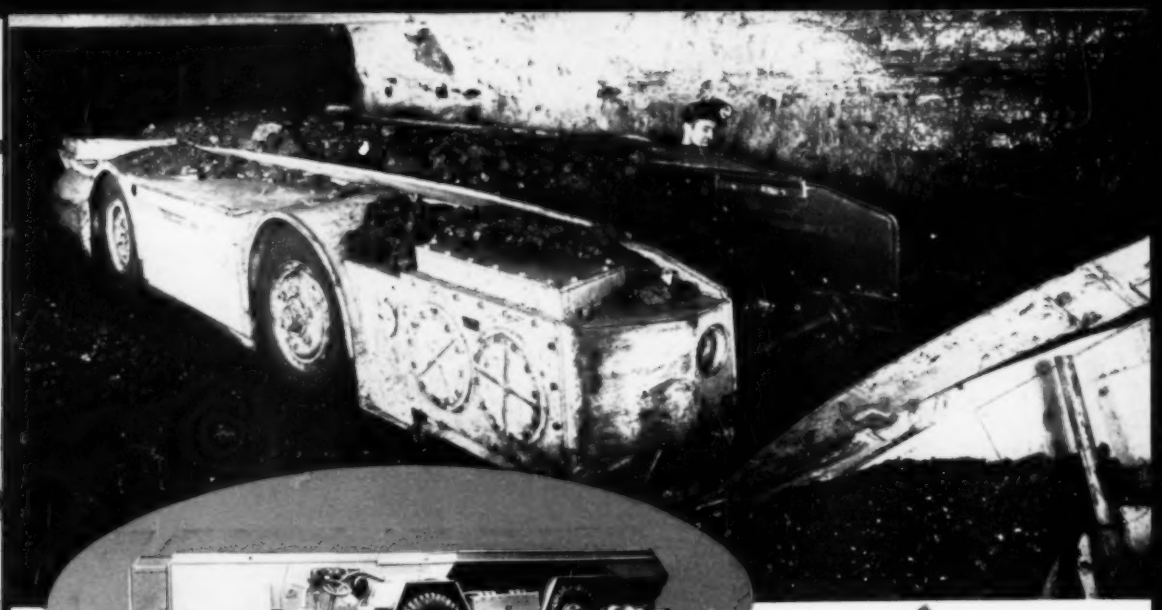
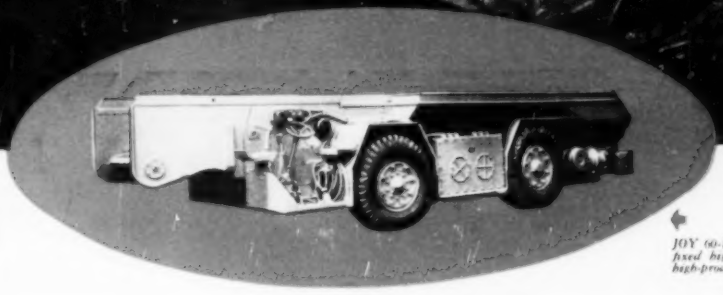


JOY 42-D Shuttle Car, battery powered for high maneuverability and fast trammimg. 5 to 7 tons capacity. Also built with hydraulic cable reel as the JOY 42-E.



JOY 60-E Shuttle Car with hydraulic cable reel, fixed high discharge, 10-ton capacity. Ideal for high-production tramferring in thick-seam mining.

There's No "Bottle-Neck" between Loaders and Main Haulage with

JOY

42" SHUTTLE CARS ON THE JOB!

For greatest advantage in trackless or track mining, thick seams or thin, use modern, highly-efficient JOY Machines

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JOY MANUFACTURING COMPANY

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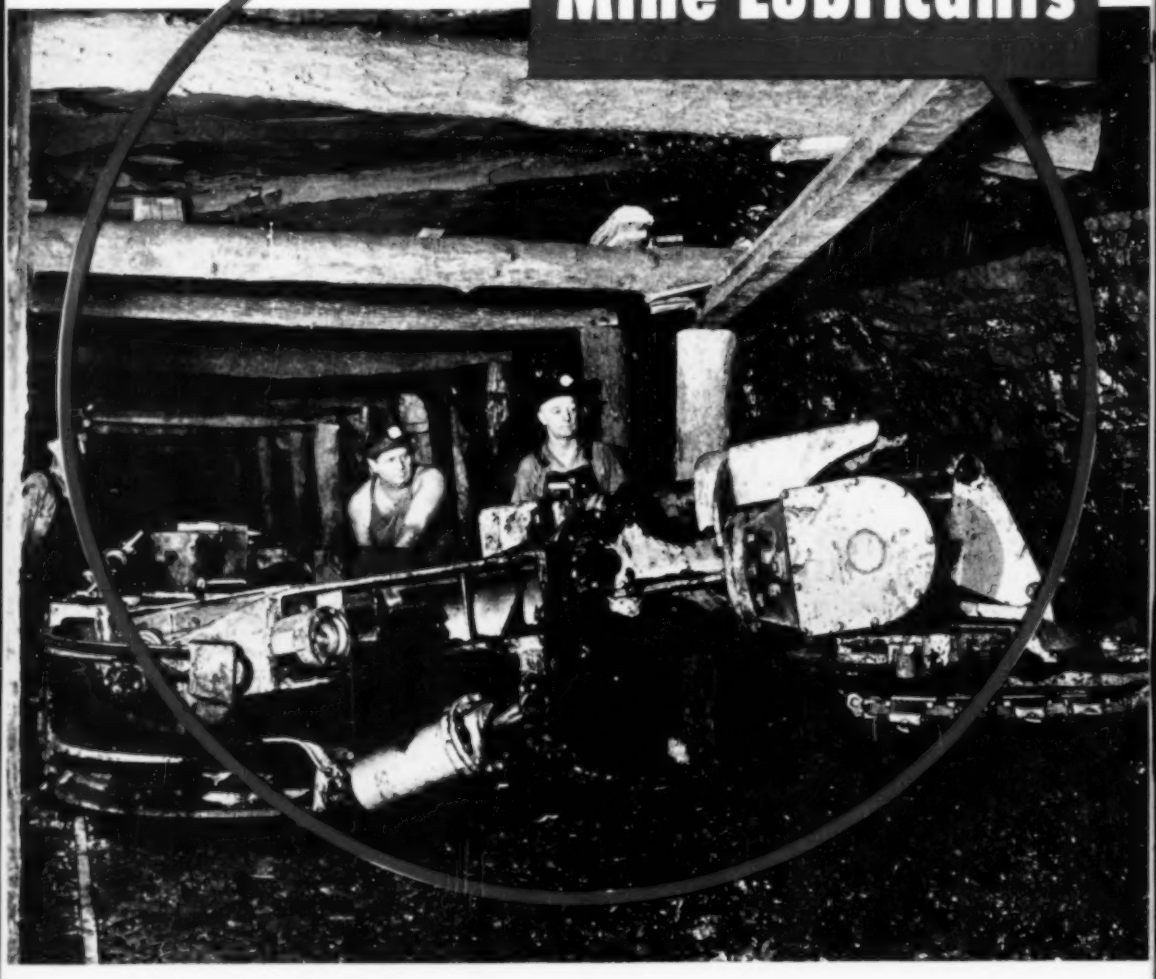
IN CANADA: JOY MANUFACTURING COMPANY (CANADA) LIMITED, GALT, ONTARIO

Now! Cutter and Loader Lubri

Superla
Mine Lubricants



STANDARD OIL COMPANY (INDIANA)

rication Improved 5 ways...

Tested in midwest mines under severest conditions of operation, Superla Mine Lubricants have brought these improvements to cutter and loader lubrication:

1. **CLEANER OPERATION.** Superla Mine Lubricants resist heat, minimizing deterioration of the lubricant and the formation of carbon. Cleaner operation with these improved lubricants eliminates a frequent cause of wear.
2. **NO WARM-UP TIME.** Superla Mine Lubricants are fluid at low temperatures. When the machine starts, controls operate freely. Wear is reduced because the lubricants flow readily to bearings, gears and clutches.
3. **NO OVERHEATING.** Superla Mine Lubricants do not thin out excessively at machine-operating temperatures. This quality assures proper lubrication of machine parts during long periods of continuous operation.
4. **EASY TO DISPENSE.** Superla Mine Lubricants pour readily from bung-type barrels (except the two heaviest grades which are used only for special loader conditions). They also handle easily in all types of dispensing equipment.
5. **LOW CONSUMPTION.** Superla Mine Lubricants have reduced consumption as much as 15% in severe mine tests.

A Standard Oil Lubrication Engineer will be glad to help you test Superla Mine Lubricants in your machines. Write Standard Oil Company (Indiana), 910 S. Michigan Ave., Chicago 80, Ill.

Six Grades for lubricating any type of cutter or loader...

No. 00. An oxidation-inhibited oil containing a detergent additive. It provides exceptionally clean operation and low oil consumption for oil-lubricated gear cases.

No. 0. A high quality additive type oil similar to No. 00 except that it is a slightly heavier grade. It is designed for Goodman loaders and cutters.

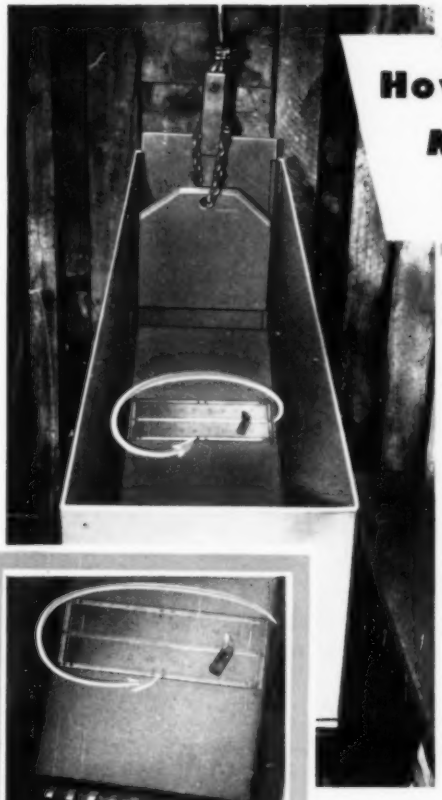
No. 2. A soft, semi-fluid grease for lubricating gathering-head gear cases, where greater fluidity is desired than that usually provided by most loader greases.

No. 4. A semi-smooth grease particularly resistant to thinning out under heat and mechanical working. At the same time it can easily be poured from the barrel bung at ordinary mine temperatures. It is especially designed for Joy loaders.

No. 6. A grease of heavy consistency and good high-temperature characteristics. Its fibrous structure makes it particularly useful on mine car wheels and for general underground lubrication.

No. 8. A smooth grease having superior high-temperature characteristics. It is suitable for armature bearings and pressure gun work where a grease of heavy consistency is desired.

STANDARD OIL COMPANY (INDIANA) STANDARD

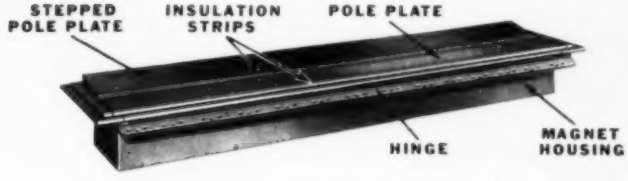


Shown above is a typical Eriez installation in a gravity flow chute protecting a coal crusher. Built the exact width of the chute, it provides efficient and economical tramp iron removal for the Jeff Mining Co., Oakdale, Penna.

How Non-Electric *Permanent* Magnets Protect Coal Preparation Equipment!

ERIEZ "Giant" Non-Electric Alnico Magnets installed ahead of coal crushers, washers, and pulverizers, form a magnetic barrier which protects these machines from tramp iron damage . . . This newly developed unit becomes a part of the bottom of a gravity flow chute and makes magnetic separation amazingly simple. Any metal being conveyed in the coal is attracted to the magnet's face plate while the non-ferrous material passes down the chute. Eriez "Giant" units are constructed with either a stepped or smooth face plate, depending upon mechanical and material factors involved in the application. Hinges permit the magnet to be swung down, which makes cleaning easy. Latches to lock the unit securely into the chute are standard equipment.

Eriez units are made of Alnico so no electricity is needed to generate a magnetic field. Since current and electrical accessories are not required, operating and maintenance costs are virtually eliminated. Extreme heat or moisture or other adverse operating conditions have no effect on Eriez equipment. For more detailed information, may we send you bulletin 102-B?



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Please send bulletin No. 102B

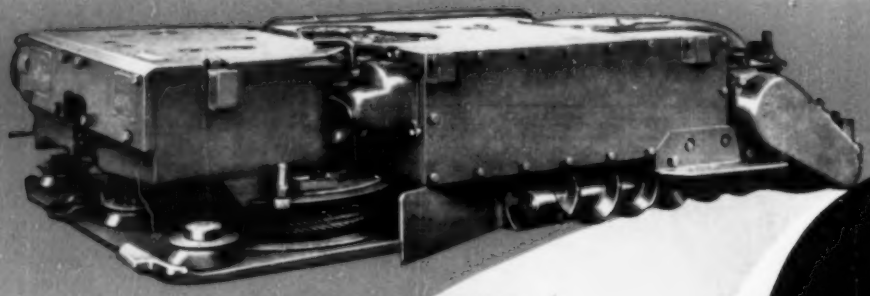
We would like to know more about installation of ERIEZ on:
☐ Gravity Conveyors ☐ Mechanical Conveyors
☐ Equipment on Processing Machines

Name .....
Address ..... City ..... State .....

● *When It's Magnetic Protection . . . See Eriez First*

ERIEZ MANUFACTURING COMPANY

60 East 12th Street, Erie, Penna.

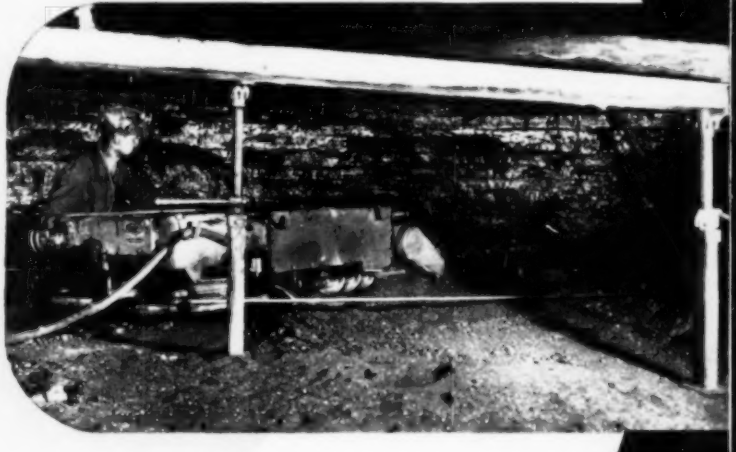


JEFFREY SLACK CONVEYOR

(Mechanism added to SHORTWALL Machines)

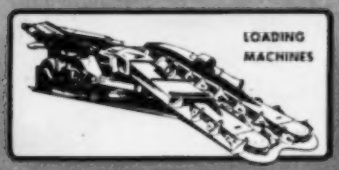
- **Assures a cleaner kerf . . . a better fall of coal**
- **Discharges bug dust in ideal location *along side* of machine**
- **Prevents cuttings being dragged back into cut**
- **Eliminates cleaning kerf by manual labor**
- **Releases a man for other duties—timbering, drilling, etc.**
- **Removes hazard of overhanging coal . . . as in hand shoveling when man must work near the face**

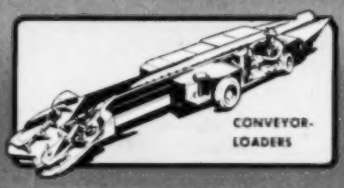
This mechanism, or screw conveyor, may be seen in the outlined view above mounted on a Jeffrey 35-L SHORTWALL cutter. It can be applied to machines in the field. Let us tell you more about it.

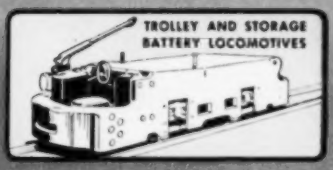


Right . . . Jeffrey 35-L SHORTWALL equipped with Slack Conveyor. Note end of screw conveyor near base of cutter for moving slack back from the finished cut.

Patented





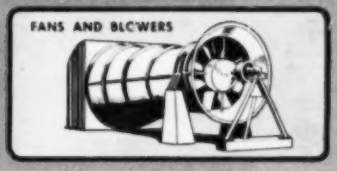


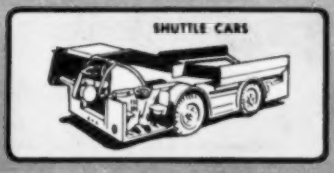
JEFFREY

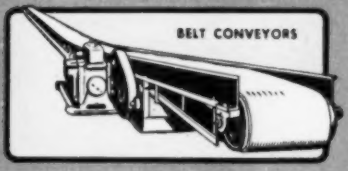
EQUIPMENT FOR COAL MINES

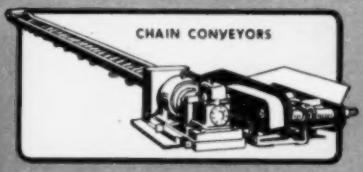
and

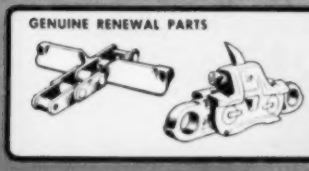
GENUINE RENEWAL PARTS











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Established 1877

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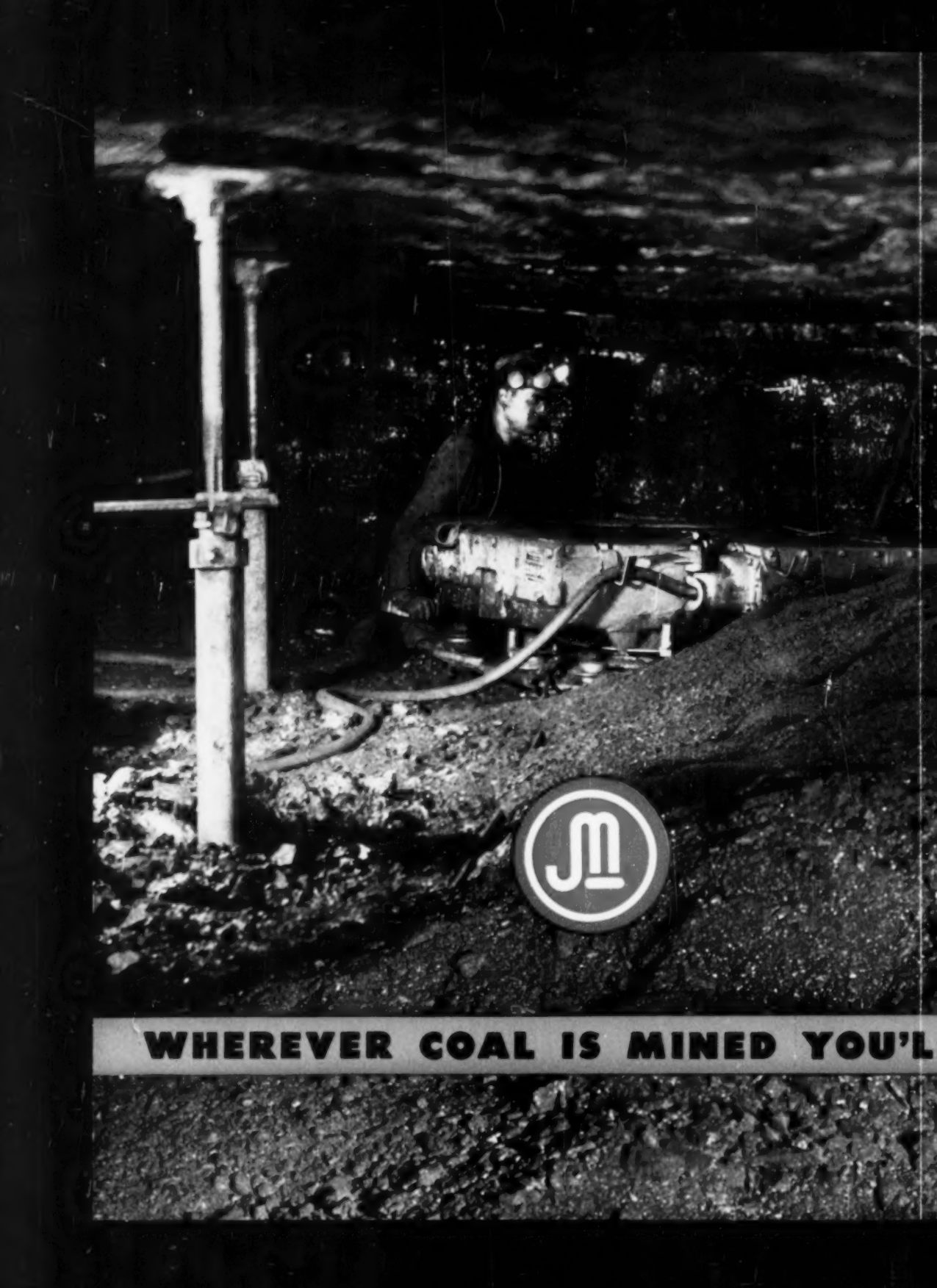
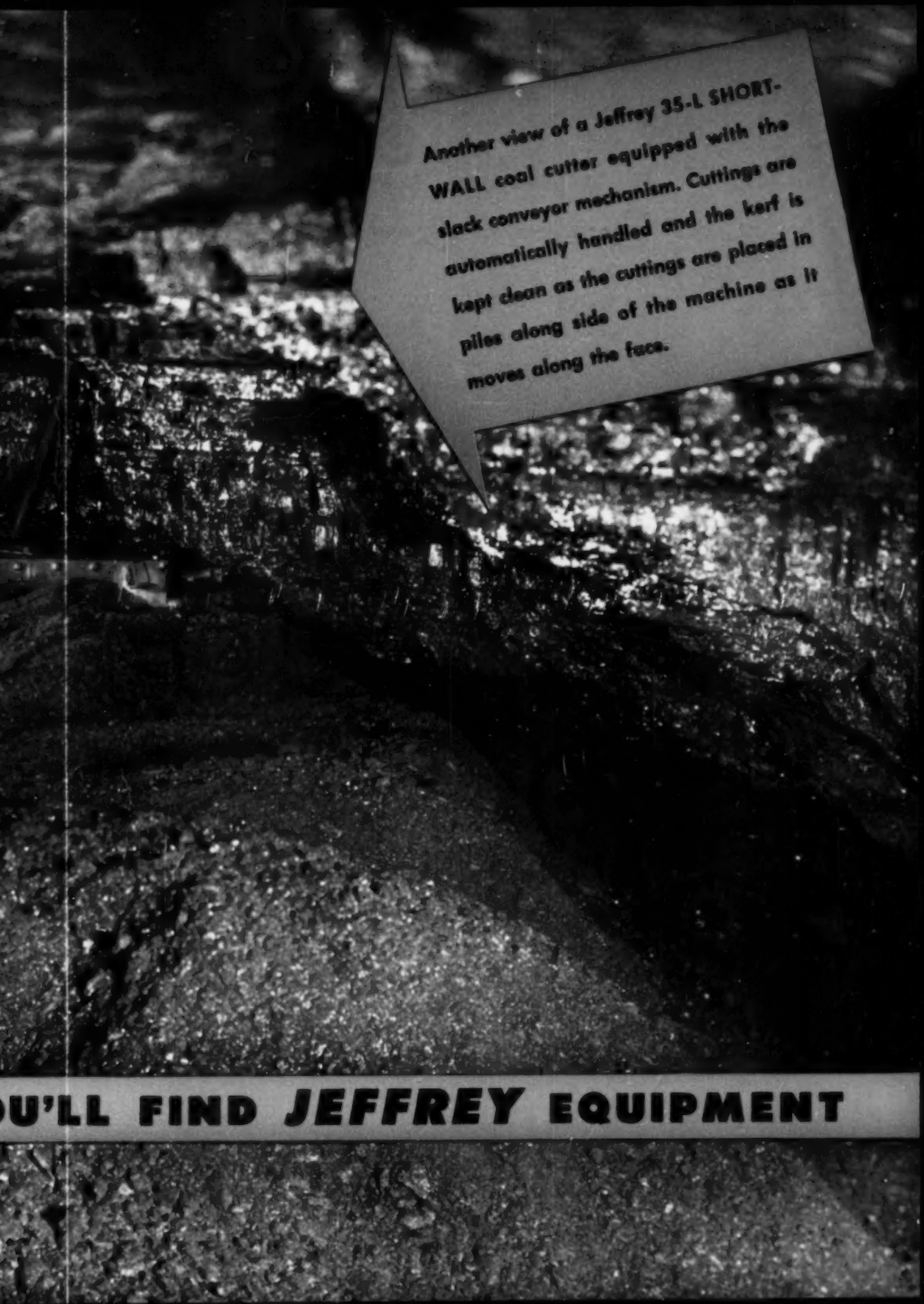
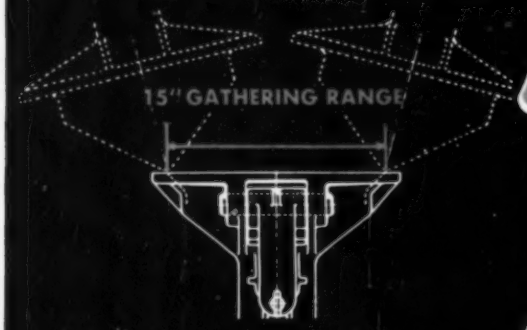

WHEREVER COAL IS MINED YOU'L



Another view of a Jeffrey 35-L SHORT-WALL coal cutter equipped with the slack conveyor mechanism. Cuttings are automatically handled and the kerf is kept clean as the cuttings are placed in piles along side of the machine as it moves along the face.

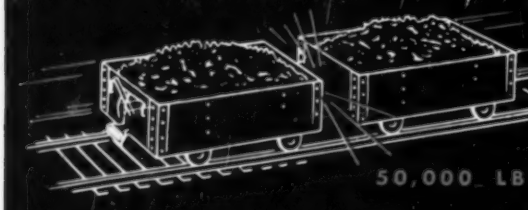
OU'LL FIND *JEFFREY* EQUIPMENT

BUILT FOR



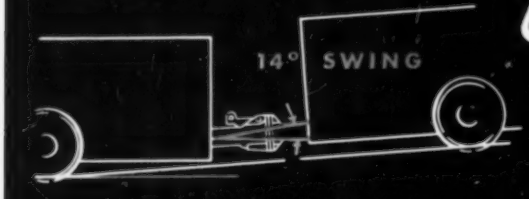
. . . ON CURVES

Male-and-female type coupler heads provide the O-B Automatic Coupler with 50 percent more gathering range than is found in ordinary couplers. Depending upon the car construction and its relation to the track, O-B Couplers will enable cars to operate over and automatically couple upon curves of minimum radius.



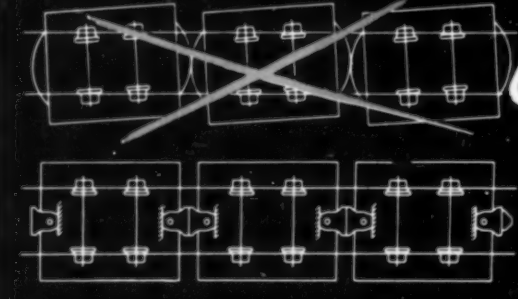
. . . UNDER HEAVY IMPACT

Tough, springy rubber buffing pads replace breakable steel springs in O-B's modern draft gear assembly. Completely enclosed, the rubber draft gear will absorb impact blows up to 50,000 pounds—as much as 100,000 pounds with the Form-8 design.



. . . OVER DIPS AND KNUCKLES

A vertical swing of 14° enables O-B Couplers to operate over sharp breaks in grade. All movement takes place in the flexible rubber draft gear—the coupler faces remain locked to each other in center-to-center position. In addition, five inches of vertical gathering range permit the couplers to join on a wide range of dips and knuckles.



. . . ON THE TRACK

Preventing zigzagging under push or buff, O-B Form-8 Couplers actually help to keep your cars on the track. An improved draft gear construction holds the cars tightly in center-to-center position counteracting the car's normal tendency to ride the rail under push or buff.

MINE WORK

Take a good look at the O-B Automatic Coupler in the picture above. It appears to be different from railroad-type couplers. It *is* different—and for good reasons, too! Railroad-type couplers were developed for railroads with their long stretches of straight track and gradual curves and grades. Mining service imposes an entirely different set of conditions. It requires a coupler which is designed specifically to meet those conditions.

Because mine curves have shorter radii and coupling on curves is frequent, O-B Couplers are provided with extra-wide gathering range. They permit cars to operate over sharp breaks in grade at dips and knuckles. Their sturdy rubber draft gear will absorb severe impact blows without damage. The O-B Form-8 Coupler exerts a stabilizing pressure to counteract a mine car's normal tendency to derail under push or buff.

If you are considering the purchase of new mine cars, you will find it profitable to investigate the O-B Automatic Coupler—the coupler that was designed specifically to meet mine operating conditions. A postcard request will bring full information.

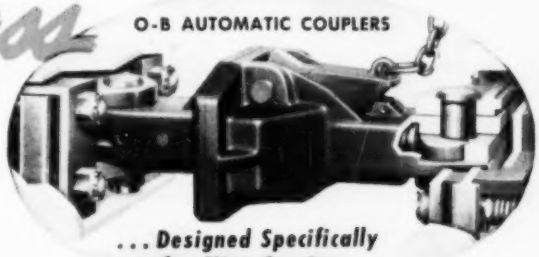
2800-AM

Ohio Brass

MANSFIELD, OHIO

Canadian Ohio Brass Co., Ltd.,
Niagara Falls, Ontario

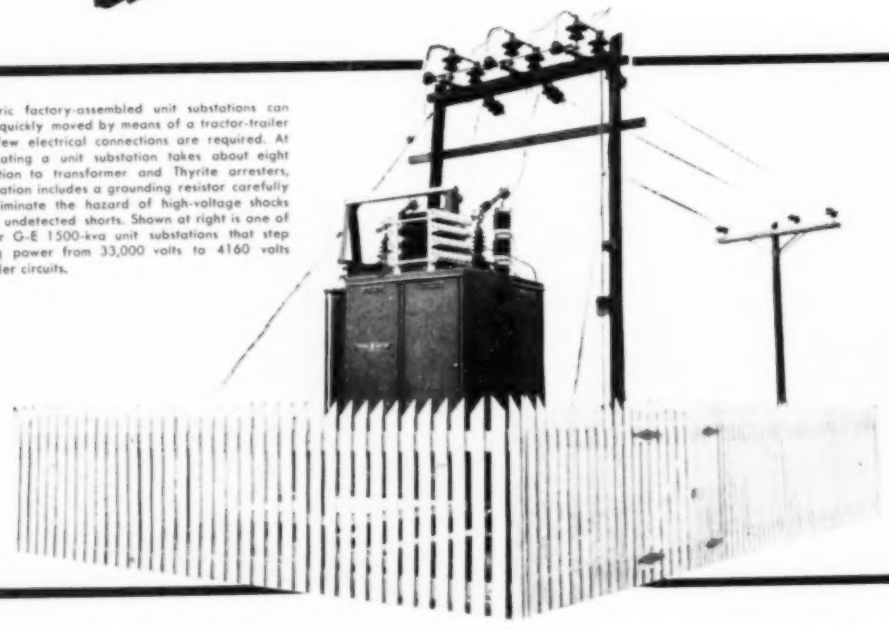
O-B AUTOMATIC COUPLERS



. . . Designed Specifically for Mine Service

"the saving is tremendous!"

General Electric factory-assembled unit substations can be easily and quickly moved by means of a tractor-trailer unit. Only a few electrical connections are required. At Maumee, relocating a unit substation takes about eight hours. In addition to transformer and Thyrite arresters, each unit substation includes a grounding resistor carefully designed to eliminate the hazard of high-voltage shocks resulting from undetected shorts. Shown at right is one of Maumee's four G-E 1500-kva unit substations that step down incoming power from 33,000 volts to 4160 volts for use in feeder circuits.



GENERAL ELECTRIC

"$6000 A YEAR SAVED IN POWER COSTS . . . RELOCATING COSTS CUT IN HALF!"

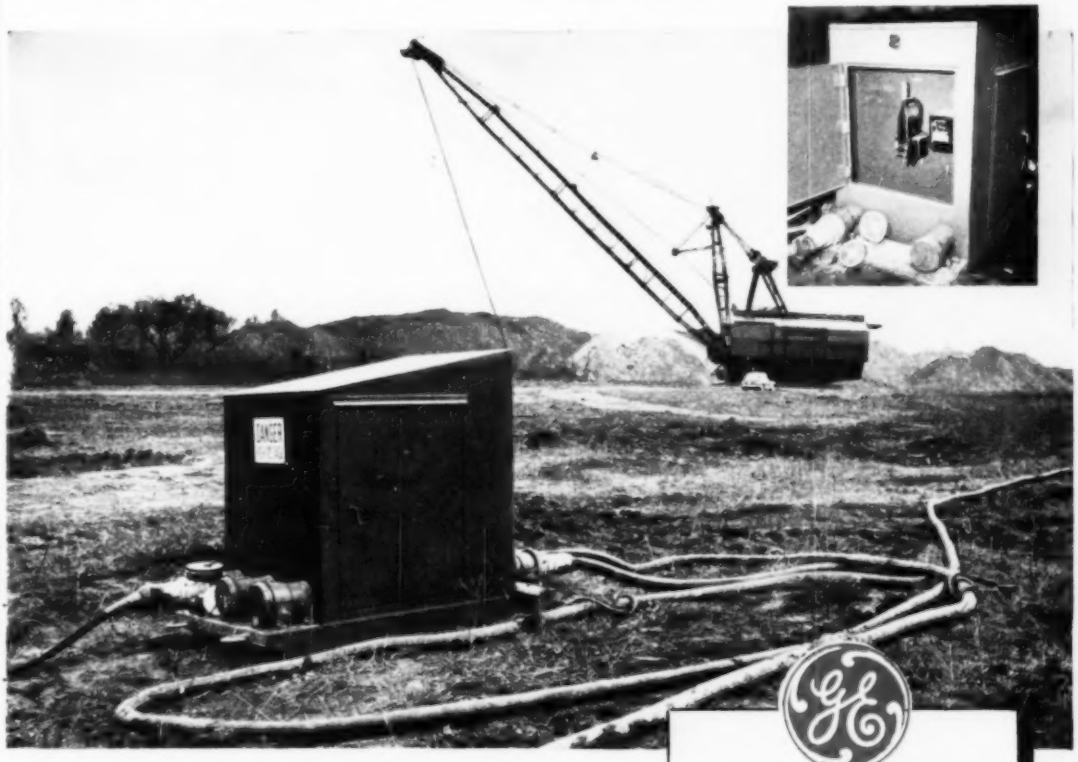
That's what Mr. Evans Bennington, Supt. of Electrical Maintenance at Maumee Collieries, says of their co-ordinated G-E power distribution system for strip mining units.

Here's an outstanding example of modern, efficient mine power distribution the Maumee Collieries Company's strip mining operations at Terre Haute, Indiana. A fully co-ordinated General Electric system, it teams up unit substations, cable, and cable-skid switch houses to cut production delays with better voltage at the pit, provide maximum safety to workmen and equipment, and reduce moving time and costs.

"Use of G-E cable and cable skids," says Mr. Bennington, "has given us a most flexible power-system arrangement for feeding shovels, draglines, loaders and other excavating equipment. The initial cost of a cable distribution system, compared with an overhead line, is approximately the same. But the cost of moving the cable system is about one-half or less the cost of moving an overhead line system. When you consider that this system has to be changed on an average of at least every six months, the saving is tremendous.

"By buying power at 33,000 volts, we have been able to combine three metering points into one. This has resulted in putting two of the operations in the low kilowatt-hour bracket. In addition, the power company gives us a 10 percent rebate for owning our own substation, which, combined with the kilowatt-hour savings, saves us about $6000 a year."

You can bring new speed, flexibility and safety plus new economies to your surface mining operations with a completely integrated G-E power distribution "package". A G-E engineer with years of experience in mining problems will gladly give you the facts. Call him at your nearest G-E office. *Apparatus Department, General Electric Company, Schenectady 5, N. Y.*



This newest-type General Electric cable-skid switch house, one of twelve in use by Maumee, provides maximum portability and convenience plus more selective tripping. Unit, weighing 1600 lbs., measures 40 in. wide, 48 in. deep, 51 in. high in front and 43 in. high in rear, exclusive of skid. Front has two sockets for incoming trunk-line cable connections (see inset, above). From the three load outlets at the rear, portable cable brings power to strip mining units. Most of Maumee's 35,000 to 40,000 feet of portable cable is G-E Type SH-D, highly resistant to rough handling and excessive flexing.

POWER DISTRIBUTION SYSTEMS

— to cut mining costs per ton!

PREPARATION vs. PROFITS
answered . . . the AMERICAN way

= UNCONTROLLED SIZING
EXCESS FINES
COARSE SIZING

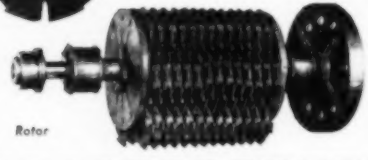
= MORE MARKETABLE and PROFITABLE CONTROLLED SIZING

Your profit is in the preparation — and American Crushers are designed especially to help you get higher tonnage — greater profits, with lower preparation costs. By reducing coal through cleavage instead of blunt shattering force, Americans give a controlled ratio of fines — no oversize — and permit a high tonnage output of uniform marketable sizes — regardless of the range of reduction.

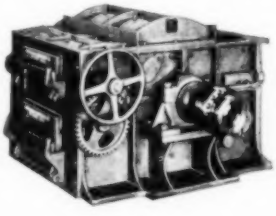
Doubly adjustable for flexibility of sizing to meet fluctuating market conditions, Americans give added savings by operating at low, power-saving speeds. Available in a wide choice of types and sizes to exactly fit your operation . . . capacities from 50 to 500 TPH.

Shredder Ring

Shown here are American's exclusive manganese steel shredder ring and rotor assembly — for rapid reduction action at slow, power-saving speeds. Each ring has twenty cutting edges — and revolves on individual shaft, free to deflect from tramp iron without damage.



Rotor



American AC Type Rolling Ring Crusher, with housing of massive, high-test cast construction, rib-reinforced to withstand enormous crushing strains. Dust-tight, machined joints. All crushing parts of manganese steel.

Send for AC Bulletin on coal crushing data and crusher specifications.

American PULVERIZER COMPANY

Originators and Manufacturers of Ring Crushers and Pulverizers

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FOR PRODUCTION GAINS and COST REDUCTION

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Consult a Joy Engineer

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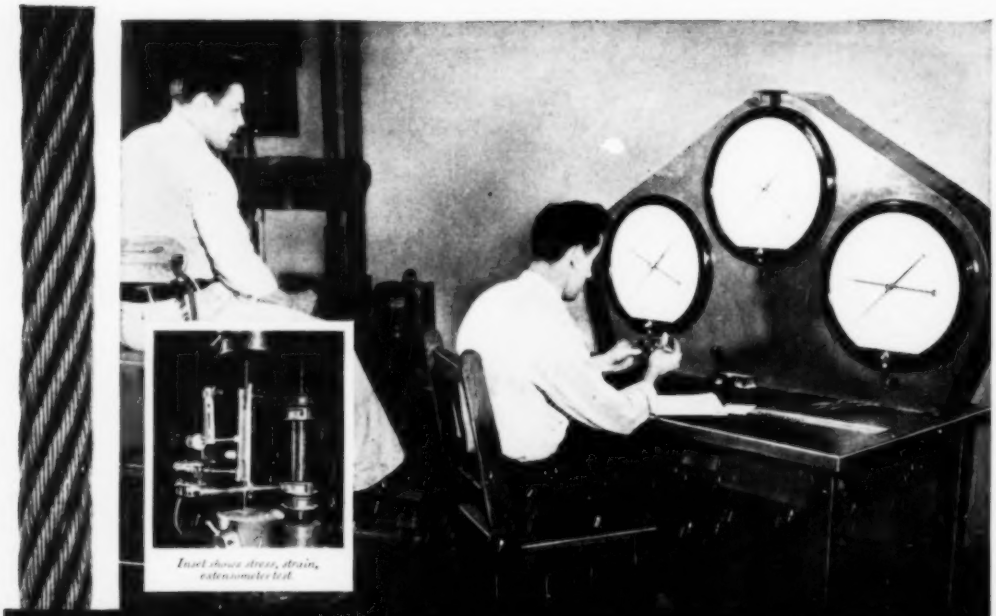

Inset shows stress, strain, extensometer test.

How to Measure the Muscle in Rope Wire

Measuring the muscle—or tensile strength—of rope is one of many important tests used in grading Wickwire Rope. And the engineers who supervise these tests are tough taskmasters.

Before they release a single coil of wire to the Rope Mill, they take two samples from each end of every coil. These samples are gauged for size and roundness. Then the wire is subjected to the extensometer test, the tensile, torsion and elongation tests. Tolerances are even more exacting than those established by the industry; any wire not meeting the standards is rejected. Colored tags listing size, strength and other data are affixed to acceptable coils. These tags stay on the coils until they are made into wire rope—and the data they contain is kept on file for future reference.

This meticulous adherence to standards characterizes every phase of Wickwire Rope fabrication. Coupled with the services of Wickwire Distributors and Rope Engineers in specifying the rope with the right kind of muscle to do your hoisting or hauling job, it is your assurance of the utmost in performance, safety and long rope life. Wickwire Rope is available in all sizes and constructions, both regular lay and WISSCOLAY *Pre*formed. Next time you order wire rope make it Wickwire Rope. After checking its performance we feel certain that you'll keep on ordering it.

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Eaton 2-Speed Axles not only add to motor truck utility and performance, but they actually effect important savings in operating and maintenance costs and add materially to vehicle life. Because Eaton 2-Speed Axles provide the right gear ratio for every road and load condition, engines may be run in their most efficient and economical speed range. Stress and wear on major vehicle parts are held to a minimum. On most trucks of 1½ tons and larger, Eaton 2-Speed Axles will actually *more than pay for themselves.* See your truck dealer for complete information.

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Check your hauling--

How many trucks -- how many trips do you require to haul 30-40-60 tons?

300 hp. Walter Tractor Truck, with 50 ton bottom dump coal trailer

--and compare with this

One WALTER TRACTOR TRUCK does it, in One fast trip!

Are you using a "fleet" to do the work of one or two Walter Trucks? A switch to Walter high-tonnage hauling will step up your production, at much lower cost per ton. Here's what other mines have found:

Walter Tractor Trucks haul huge loads at good speeds—carry higher tonnage per trip, make more trips per day. You have fewer trucks to operate and service. The great power and 100% four wheel traction hauls unfailingly on soft or slippery surfaces and grades, keeping shovels and plant working at capacity in all kinds of weather.

The smooth, tractive effort of the Walter 4-Point Positive Drive prevents wheel-spinning—the suspended double reduction drive reduces wheel pounding, to greatly minimize wear on tires and roads. Air brakes, power hydraulic steering, short wheelbase all contribute to easy, safe handling and maneuvering.

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4-POINT POSITIVE DRIVE
TRACTOR TRUCKS

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Check with us for *new* motors too. Stock or quick delivery on many sizes, types.

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MOTORS — ½ to 25,000 HP and up. Matching Allis-Chalmers Control.

TEXROPE — Belts in all sizes and sections, standard and Vari-Pitch sheaves, speed changers.

PUMPS — Integral motor and coupled types. Sizes and ratings to 2300 GPM.

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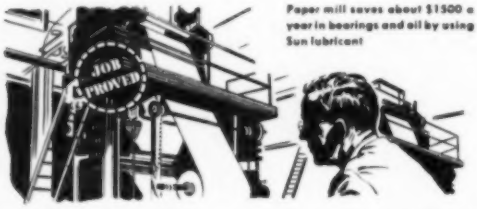
SUNVIS HD 700 OILS—High-viscosity-index oils containing additives which minimize oxidation and give detergency. Ideal lubricants for internal combustion engines subjected to continuous heavy loads under the most adverse conditions.

SUNVIS OILS—Solvent-refined paraffinic-type oils of uniform high viscosity index, low pour point, and low carbon content. Especially suitable for application to long-time use in all types of industrial reservoirs and circulating systems.

DYNAVIS OILS—Low-pour-point, high-viscosity-index, inhibited oils, containing an additive which helps prevent formation of harmful corrosive and sludge-forming acids. Well suited for engines fitted with alloy bearings and operated at high temperatures.



Paper mill saves about $1500 a year in bearings and oil by using Sun lubricant

SOLNUS OILS—Well-refined straight mineral oils. Stand up under hard use for long periods of time. Recommended for use in machine tools, air compressors, certain types of diesels, etc.

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SUNOCO WAY LUBRICANT—For use on tableways. Eliminates chatter and scoring . . . resists corrosion. Has good metal-wetting and adhesive properties, ample viscosity, and E. P. qualities.

SUN MARINE ENGINE OILS—Compounded with special emulsifying agents in order to provide adhesion to, and lubrication of, working parts in the presence of water. For the lubrication of bearings, eccentrics, crossheads, and various other parts of steam engines.

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ADHESIVE PRESSURE GREASES—Won't drip or splash. Excellent lubricants for open-gear applications.

SUN DARK PRESSURE-SYSTEM GREASES—For power-driven central grease lubricating systems in heavy industries. Also used as a "medium cup grease."

SUN MINE CAR GREASES—Available in several grades. Suitable for both antifriction bearings and plain-bearing cavity-type wheels.

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wire-cable greases. Recommended for power presses, mining machinery, worn reduction mills, crushers, pump gears, etc.

SUNOCO TRACTOR ROLLER COMPOUND—For crawler-type tractors. Provides good lubrication with exceptional sealing qualities.

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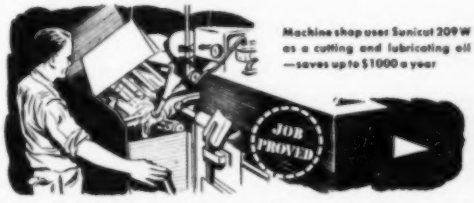
SUNICUT—Straight (non-emulsifiable) transparent cutting oils. Recommended for automatic screw machines and heavy-duty machining operations. Permit high speed production with excellent finishes, long tool life.

SUNOCO EMULSIFYING CUTTING OIL—A self-emulsifying oil which produces a stable white emulsion. Efficient and economical cooling and lubricating medium for turning, milling, drilling, and other metalworking operations on both ferrous and nonferrous metals. It is also an excellent grinding coolant.

SUN QUENCHING OILS—Specially refined oils designed to aid development of maximum physical properties in a wide variety of steels.

SUN TEMPERING OILS—Specially refined oils for tempering steel. Because of their low carbon content and stability under heat, these oils have an unusually long service life.



Machine shop uses Sunicut 209W as a cutting and lubricating oil—saves up to $1000 a year

SUN ROLLING OILS—Straight and emulsifying oils which will permit maximum production in rolling steel, aluminum, brass, and copper.

SUN ANTI-RUST COMPOUNDS—Petroleum-base oils with chemical additives designed to prevent the rusting and corrosion of steel.

REFRIGERATION OILS

SUNISO REFRIGERATION OILS—Have extremely low pour points, extremely low wax-separating characteristics, a high degree of stability and long life. Initially neutral and resistant to formation of detrimental acids under service conditions. Suniso Oils are high quality oils suitable for both high- and low-temperature operations. The most widely used oils in refrigeration and air-conditioning.

Sports arena steps up compressor efficiency 15% by switching to Suniso Oil

TEXTILE-PROCESSING OILS

SUNOTEX TEXTILE OILS—Designed to impart certain additional properties to various forms of fibers during their processing from the fiber state into a manufactured product. All Sunotex textile oils are emulsifiable in water. Highest rating in fadometer tests.

SUN COTTON CONDITIONING OILS—Pale mineral oils which condition the cotton. They prevent waste by cutting down excessive amounts of "fly" (fine air-borne lint particles).

Worsted mill obtains easier scouring, better quality, larger yield with Sunotex WO-220

SUN ASBESTOS FIBER CONDITIONING OIL—Used for spraying on the asbestos during processing. Fibers are kept from being damaged or broken down, and harmful dust is minimized when this product is used.

SUN CORDAGE OILS—Generally used alone, but are adaptable to various formulas used by cordage manufacturers. Selected products, highly compatible with additives.

RUBBER-PROCESSING AIDS

CIRCOSOL-2XH—An elasticator and processing aid for natural rubber and especially for GR-S. Outstanding for sponge rubber.

CIRCO LIGHT PROCESS AID—A processing agent and excellent softener for natural rubber, natural rubber reclaims, and neoprene synthetic rubber. Used for GR-S to some extent.

SUNDEX-54—An inexpensive product suitable for processing GR-S and blends of GR-S and natural rubber. An established processing aid for rubber footwear stocks and semihard rubbers.

Rubber plant cuts out production step, eliminates wrinkles and rejects with Circosol-2XH

CIRCOMAR-5AA—A black-colored product for processing natural and GR-S rubber used in tire-making. Also used in reclaiming natural-rubber scrap. Replaces asphalt fluxes. Free-flowing at room temperature.

WAXES

Sun's new wax plant will be completed in 1949. Its many refining innovations and extreme flexibility will permit new types of waxes to be manufactured in large quantities—a procedure heretofore impracticable. A wide range of fully refined paraffin and microcrystalline waxes will be "tailor-made" to meet the requirements of virtually all major industrial applications. Pilot plant samples of several grades are now available.

MISCELLANEOUS INDUSTRIAL PRODUCTS

SUN SOLVENTS—Sun Spirits for the thinning of paints, varnishes, and enamels, and for metal-cleaning . . . a pure, water-white petroleum solvent free of corrosive sulphur. Other Sun solvents with special properties are available for the chemical industry.

SUN LEATHER OILS—Mineral-base leather oils. Used for obtaining the desired tensile strength, proper temper, and controlled moisture content. Maintain a light even color . . . mix well . . . distribute evenly.

"JOB PROVED" IN EVERY® INDUSTRY

PRODUCTS SUNOCO

Worn Sheaves are on his blacklist

Sheaves, the Bethlehem man will tell you, can be a big factor in the life of wire rope. Whenever he sees a rope that looks "chewed up," one of the first things he investigates is the sheaves. If they're badly worn, he suggests they be replaced or remachined. This is the stitch in time that saves nine—sometimes more.

Soft sheaves are often corrugated by the action of the rope passing over them. The same thing can happen to drums and rollers. These corrugations, or ridges, frequently grow so sharp that they nick and abrade the wires of each new rope installed. When this occurs, and you let it go on, it's just like throwing money away. Keeping a worn sheave — and spoiling a fine rope — is false economy, any way you look at it.

The Bethlehem field man is trained to ferret out such things. That's part of his job. He knows—and he wants *you* to know —how rope life can be prolonged. He'll gladly suggest a few simple precautions—like sheave maintenance — that help turn the trick.

Remember, whenever you need his help in wire-rope matters, it's yours for the asking. No cost, no obligation. Simply call the nearest Bethlehem office or distributor.

BETHLEHEM STEEL COMPANY
BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation
Export Distributor: Bethlehem Steel Export Corporation

When you think WIRE ROPE . . . think BETHLEHEM

Robins Gyrex Screen gives thrifty, dependable service on same installation since 1933

For more than 15 years the Robins Gyrex Screen pictured above has given low-cost service at the Mohawk Mining Co., Kittanning, Pa.

"It just runs on and on!" says D. H. Turner, Mohawk president.

Such long service is typical of what you can expect from Robins Gyrex Screens. You can use them for a wide variety of sizing or separating jobs—for coal, coke, gravel, stone, sand, rock, ore and many bulk materials.

Developed by Hewitt-Robins, the Gyrex vibrating screen is extremely versatile. It can separate as many as six different sizes at one time. It can size anything from fine hair to coarse rock. And it can handle hundreds of tons of bulk material every hour.

Once *you* install a Gyrex Screen, you will soon discover these five advantages:

1. Smooth operating. Has powerful vibration within itself. Yet *does not vibrate* the building or supports.

2. Versatile. Available in a weight to meet any class of service—a size to solve every problem. More than 300 models and styles.

3. Economical. Uses minimum of power per ton of material screened.

4. High capacity and efficiency. Uniform positive motion and correct centrifugal action.

5. Long life, low maintenance cost. All bearings super-sealed. All permanent connections electric-welded. All service connections jig-drilled for fitted bolts.

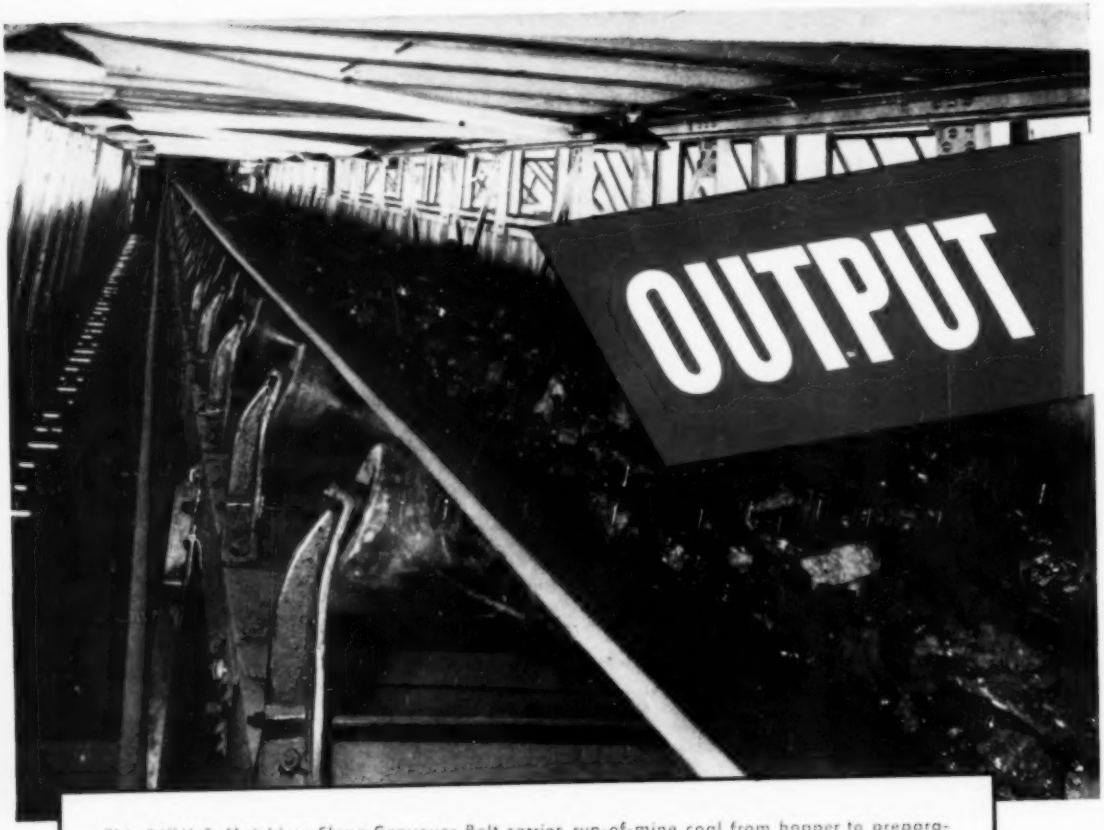
ROBINS

GYREX SCREENS

Consult Robins now. There's a Gyrex Screen to meet *your* exact needs.

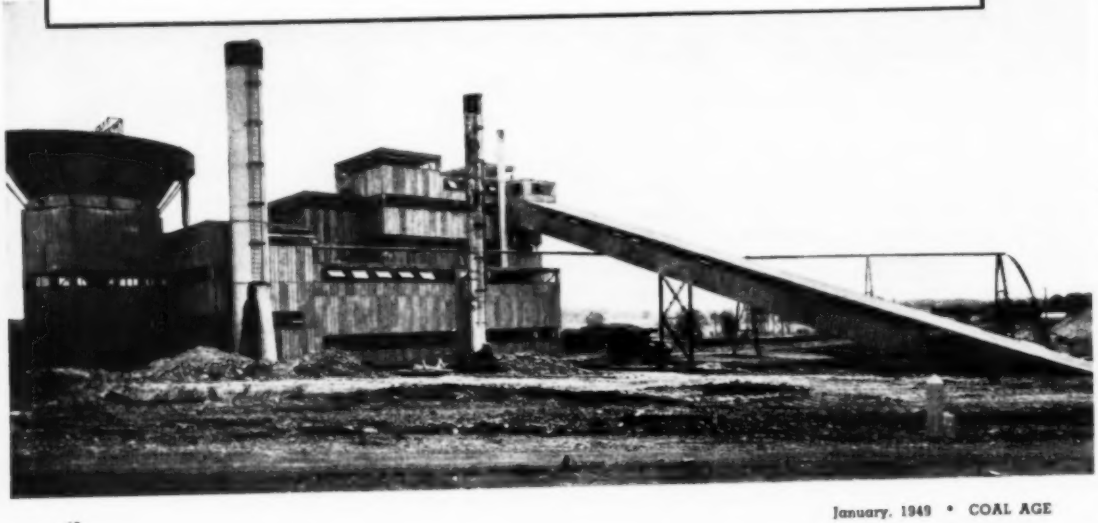
SEND TODAY for Robins Bulletin No. 115-A. Fully illustrates and describes features, advantages and benefits of efficient Gyrex Screens. Address Robins Conveyors Division, 270 Passaic Avenue, Passaic, New Jersey.

ROBINS CONVEYORS DIVISION **HEWITT-ROBINS INCORPORATED**

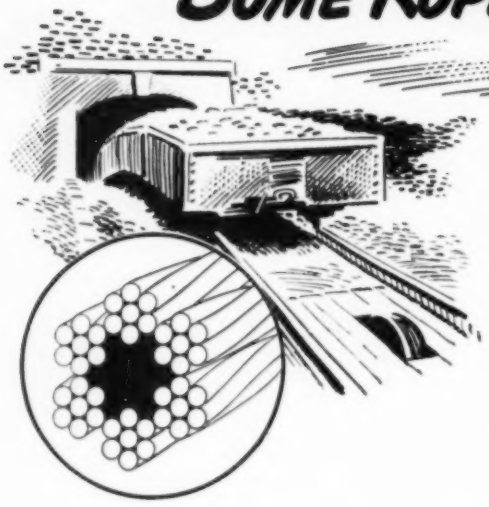


This 54" U. S. Matchless Slope Conveyor Belt carries run-of-mine coal from hopper to preparation plant.

Designed by Coordinated Engineering for 1000 T. P. H., this belt has been operating successfully for over 8 years—the highest tonnage era in coal history.

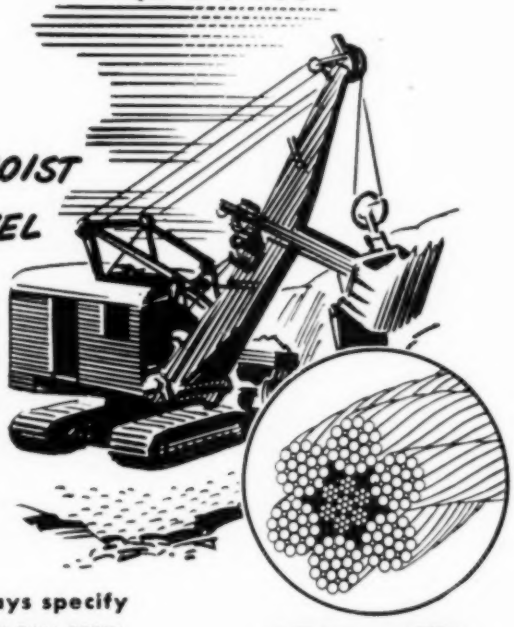


SOME ROPES FOOL YOU



U-W 6x7 WIRE ROPE IS GOOD FOR SLOPE HAULAGES BECAUSE IT IS COARSE AND RESISTS ABRASION —

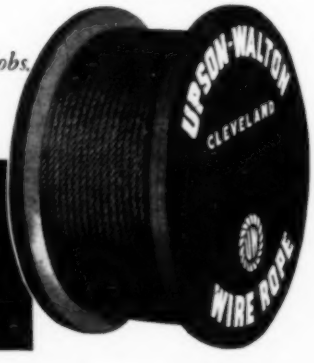
BUT...



FOR BOOM FALLS AND HOIST ROPES ON A POWER SHOVEL IT'S TOO STIFF. HERE WE RECOMMEND USING U-W 6x19 FILLER WIRE CABLE WHICH IS MUCH MORE FLEXIBLE

For longest and best service, always specify
U-W LAYRITE (*Preformed*) IMPROVED PLOW STEEL

We invite you to let UPSON-WALTON engineer your tough rope jobs.



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Manufacturers of Wire Rope, Wire Rope Fittings, Tackle Blocks, Brattice Cloth
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THE NON-EXPLOSIVE MINING METHOD

THESE 157 OPERATORS

Are Now Using

THE NON-EXPLOSIVE MINING METHOD

WEST VIRGINIA

Algoma Coal and Coke Company ..... (3)
American Coal Company
Brule Smokeless Coal Company
Clear Creek Coal Company
Crozer Coal and Coke Company
I. W. Davis Coal Company
Delmont Fuel Company
Eleanor Coal Company ..... (2)
Gay Mining Company
Dorothy Gordon Coal Company
Gulf Mining Company
Hoylman Coal Company ..... (4)
Hutchinson Coal Company
Koppers Coal Division
Leckie Smokeless Coal Company
Minds Coal Mining Corporation
Nicholas Webster Coal Corporation
Otter Eagle Coal Company ..... (5)
Pardee and Curtin Lumber Company
Pecks Run Coal Company
Premier Pocahontas Collieries
Raine Lumber and Coal Company
Raleigh-Wyoming Mining Company
Red Jacket Coal Company
Richwood Sewell Coal Co.
Rupert Smokeless Coal Co.
Sycamore Coal Co. ..... (3)
Tioga Coal Corporation
Truax-Traer Coal Company
United Pocahontas Coal Company
West Gulf Coal Co.
Weyanoke Coal and Coke Company
Winding Gulf Collieries
Wood Coal Company

VIRGINIA

Blackwood Fuel Company, Inc. ..... (2)
Clinchfield Coal Corporation ..... (2)
Coal Processing Corporation
Page Pocahontas Coal Corporation ..... (2)
Sycamore Coal Corporation
Virginia Harlan Coal Company

KENTUCKY

Bell & Zoller Coal & Mining Company
Bell Coal Company
Big Jim Coal Company
Blue Bird Mining Company
Cairnes Coal Company
Cardinal Coal Company
Cinderella Coal Corporation
Correale Coal Mining Corporation
Creech Coal Company
Elkhorn Coal Company
Fourseam Coal Corporation
Kentland Elkhorn Coal Co.
Knott Coal Corporation
Luserne-Graham Mining Corporation
Marlowe Coal Company
Smith Coal Co.
Stoker Coal Company

TENNESSEE

Rennebaum Coal Company
Straight Fork Coal Company

PENNSYLVANIA

Adamsburg Coal Company
The Berwind-White Coal Mining Company
Buller Consolidated Coal Company
Charles E. Campbell
Evans Coal Company ..... (5)
Moffit Coal Company
Pittsburgh Coal Company
Pittsburgh Consolidation Coal Co.
Republic Steel Company
Wallwork Coal Company
Washington Coal Company ..... (2)
Westmoreland Coal Company

*INDICATES NUMBER OF MINES USING THE NON-EXPLOSIVE MINING METHOD

CARDOX CORPORATION

ANNUAL *Roll Call*

OHIO

Hanna Coal Company of Ohio
The Hocking Valley Mining Company
Pittsburgh Plate Glass Company

ILLINOIS

Bell and Zoller Coal and Mining Co. (4)
Blue Bird Coal Company (3)
Bugos-White Coal Co.
Carmac Coal Company
Chicago, Wilmington & Franklin Coal Co. (2)
The Consolidated Coal Company (3)
Dering Coal Company
Franklin County Coal Corporation
Freeman Coal Mining Corp.
Mid Continent Coal Corporation
Moffat Coal Company (5)
Edward Mohn & Son (5)
Old Ben Coal Corporation
Peabody Coal Company (3)
Pschirrer & Sons Coal Co.
Sahara Coal Company
Sparta Coal Company
Truax-Traer Coal Company
Union Colliery Company

INDIANA

Black Hawk Coal Corporation
Enoca Collieries Company (2)
Walter Bledsoe & Co.
Glendora Coal Company (2)
Ingle Coal Corporation
Knox Consolidated Coal Corporation
Linton Summit Coal Co.
Pandora Coal Corporation
Princeton Mining Company
Pyramid Coal Corporation
Ra-Dock Coal Company
Rudolph Oil and Coal Company
Snow Hill Coal Corp.
Standard Coal Company
Templeton Coal Company (2)
Three Coal Co.
Wolf-Koeniq Corporation

IOWA

Shuler Coal Company

OKLAHOMA

Buck Creek Mining Company
Premium Smokeless Coal Company
Reliance Smokeless Coal Company

COLORADO

Bear Coal Company
Black Diamond Fuel Company
Boulder Valley Coal Company
Calumet Fuel Co.
Canon Black Diamond Coal Company
Canon Monarch Coal Company
Canon National Coal Company
Clayton Coal Company (3)
Colorado Fuel & Iron Corporation
Colowyo Coal Company
Consolidated Coal & Coke Company
W. D. Corley, Jr.
Cribbs-Goodman Coal Company
Domestic Coal Company
Double Dick Coal Company
Dry Creek Coal Company
Graden Coal Company
Griffith Coal Mining Company
Imperial Coal Company
Imperial Smokeless Coal Company
Juanita Coal & Coke Co.
Keystone Coal Company
Liley & Merlino
Louisville Lafayette Coal Co.
McNeil Coal Corporation
Oliver Coal Company (2)
William E. Russell Coal Company
Tomahawk Coal Co.
Vento Coal Company (2)
Victor-American Fuel Company

MONTANA

Bair-Collins Coal Company
Jeffries Coal Company
The Roundup Coal Mining Company
Western Coal Co.

WYOMING

Sheridan Wyoming Coal Company (2)
Storm King Coal Co.

UTAH

Uta-Carbon Coal Company

NEW MEXICO

St. Louis, Rocky Mountain & Pacific Co. (2)

ARKANSAS

Smokeless Coal Company

CANADA

Lethbridge Collieries, Limited
The Monarch Coal Mining Company, Limited
West Canadian Collieries, Ltd. (2)

MEXICO

American Smelting & Refining Company

NEW! Permissible Tramdrill one-man operation

Here's the ideal equipment for the trackless mine . . . mobile . . . easy to operate . . . drills shot holes in coal up to 4½" in diameter . . . also drills in slate and other rock (except sandstone).

Definitely a one-man drill, it is merely necessary to move the unit to the face, swing the drill into position and turn on the power. Holes can be drilled at any angle and within four inches of the roof or of the bottom.

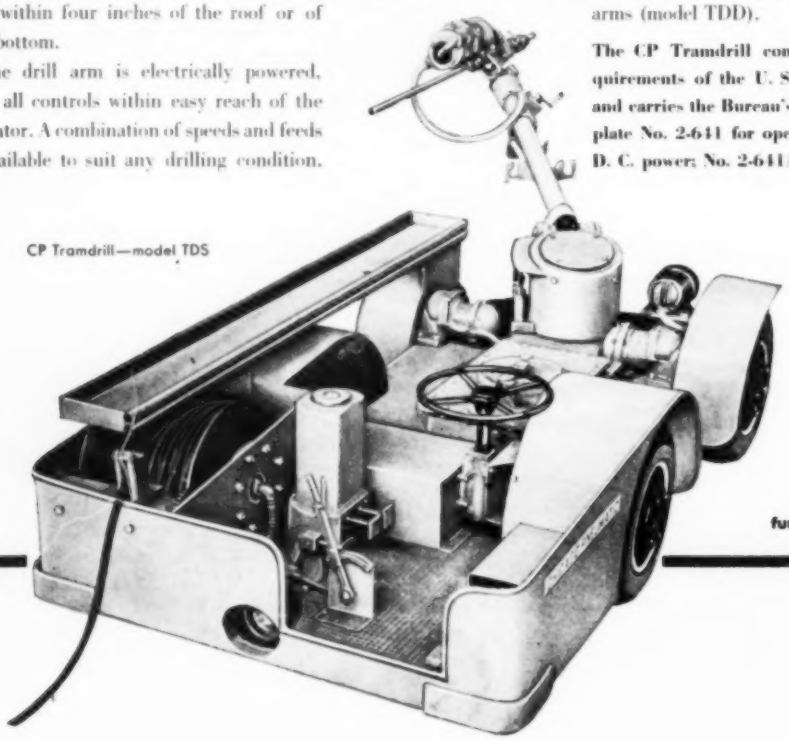
The drill arm is electrically powered, with all controls within easy reach of the operator. A combination of speeds and feeds is available to suit any drilling condition.

A safety interlocking switch cuts the power from the drill motor while tramming, and prevents truck from being moved when drill is operating.

The CP drill truck has nine inches of road clearance, and with automotive type of steering can be handled easily in narrow working places or entries.

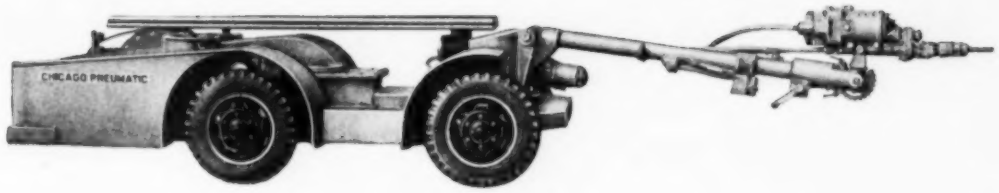
The CP Tramdrill can also be equipped with two drill arms (model TDD).

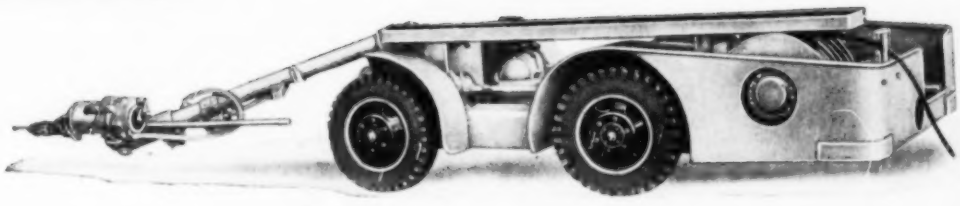
The CP Tramdrill complies with all requirements of the U. S. Bureau of Mines and carries the Bureau's permissible name plate No. 2-641 for operation on 250-volt D. C. power; No. 2-641A on 500 volt D.C.



CP Tramdrill—model TDS

Write for further information.





SOME EXAMPLES OF CP DRILL ARM PERFORMANCE

Eighty 4½″ 8-foot holes, in ten 22-foot places, per shift, half in coal and half in rock, is regular performance in one Ohio mine.

In another mine ninety-six 2½″ 8-foot holes are drilled per shift, in sixteen 22-foot places.

In a third mine 1⅞″ 6-foot holes are drilled in rock in 45 to 50 seconds per hole.

SPECIFICATIONS—TDS TRAMDRILL

Overall height	38½ inches
Overall width	78 inches
Wheel base	60 inches
Wheel gauge	67 inches
Overall length with 7-foot arm	20 feet, 5 inches
Ground clearance	9 inches
Weight, with one 7-foot arm	6200 pounds
Cable reel capacity	600 feet of No. 8-3 conductor

CHICAGO PNEUMATIC TOOL COMPANY

General Offices: 8 East 44th Street, New York 17, N. Y.

ELECTRIC TOOLS • PNEUMATIC TOOLS • AIR COMPRESSORS • ROCK DRILLS
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How the proper application

# of wire rope

-may save you money

● Every user wants to get the best possible service out of his wire rope but it is amazing how often simple rules are broken in the field. Some operators are careless when installing a new rope . . . they keep machines running when sheaves are badly worn . . . they overload the rope . . . they forget to lubricate the rope.

To help eliminate these human failings, the American Steel & Wire Company maintains a staff of TIGER BRAND Wire Rope Specialists. These men are experienced field service engineers. If you have not checked your equipment recently, for correct wire rope application, call in the TIGER BRAND Specialist. He'll do the job for you without charge. Here are some of the points he checks before recommending the proper wire rope for your job—

1. Method of installing and caring for rope.
2. Diameter of sheaves and drums, and condition of grooves.
3. Arrangement of sheaves.
4. Fleet angles.
5. Loads handled.
6. Rope speeds, acceleration and deceleration.
7. Presence of vibration, whipping.
8. Lubrication.
9. Corrosion.
10. Amount of scrubbing and abrasion.
11. Fitting attachments.
12. Abuses to be corrected.
13. Analysis of service records.
14. Finally: Recommendation of the correct rope to meet all conditions.

To show you how you can save money on wire rope, we have prepared a booklet on proper wire rope application that every user of wire rope should read. You can get a copy by mailing the coupon.

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Excellay Preformed

UNITED STATES STEEL

Now..Coal Dust Sealed In!

New S-D "Sealed Automatics" Keep Coal Dust Off Of The Tracks . . . Eliminate Costly Clean-Up!

Now you can have the S-D 1-2-3 "automatic", COMPLETELY SEALED against coal dust leakage. Coal dust that, under certain conditions, would sift through the small space between the drop-bottom door and the car frame, is now carried across this opening by our EXCLUSIVE dust-roof seal. Special coverings protect the axle openings and provide a positive seal against dust at that point. Accumulations of coal dust on the tracks often constitute an undesirable condition, and removal or clean-up is a costly operation that has run over $10,000 annually in some mines. Mines equipped with S-D "Sealed Automatics" are free of the trouble and expense of coal dust deposits on their tracks . . . that's why many operators have already started replacing old cars with S-D "Completely Sealed Automatics" . . . working toward the day when their mines will be completely dust-free.

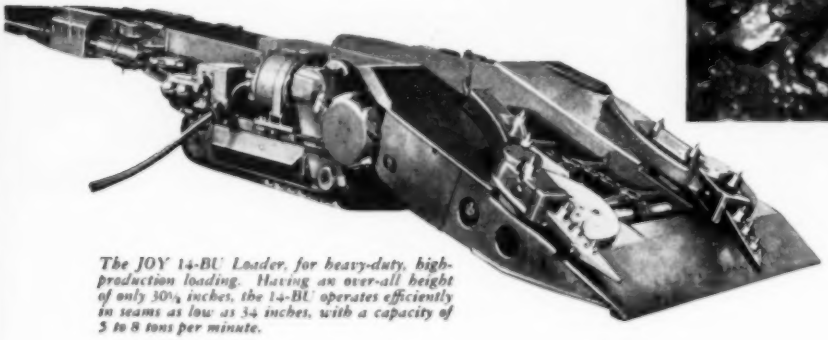
This exclusive COMPLETELY SEALED feature is available on all S-D "Automatics" whether they be 1½ ton regular cars or 30 ton eight-wheelers. And, of course, you still get all the other fine features that have made S-D "Automatics" famous . . . long-life construction . . . big capacity . . . fool-proof "Jerk-Out" unlatching device that operates underneath the car and the automatic 1-2-3 dumping that lays the coal down in the bin gently yet rapidly and with minimum coal breakage. That's the S-D "Automatic" . . . now COMPLETELY SEALED.

20 Car loads of "Automatics" from—

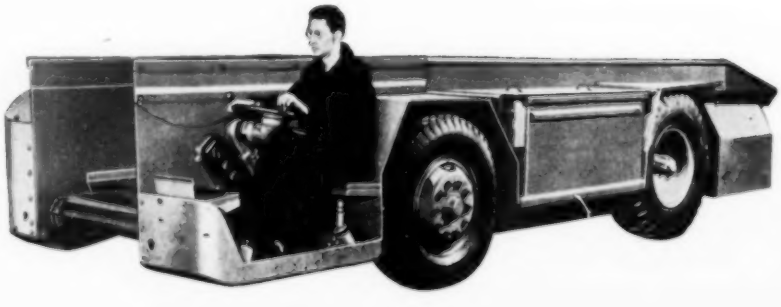
SANFORD-DAY IRON WORKS, Inc. Knoxville 9, Tenn.

JOY LOADS COAL FASTER!

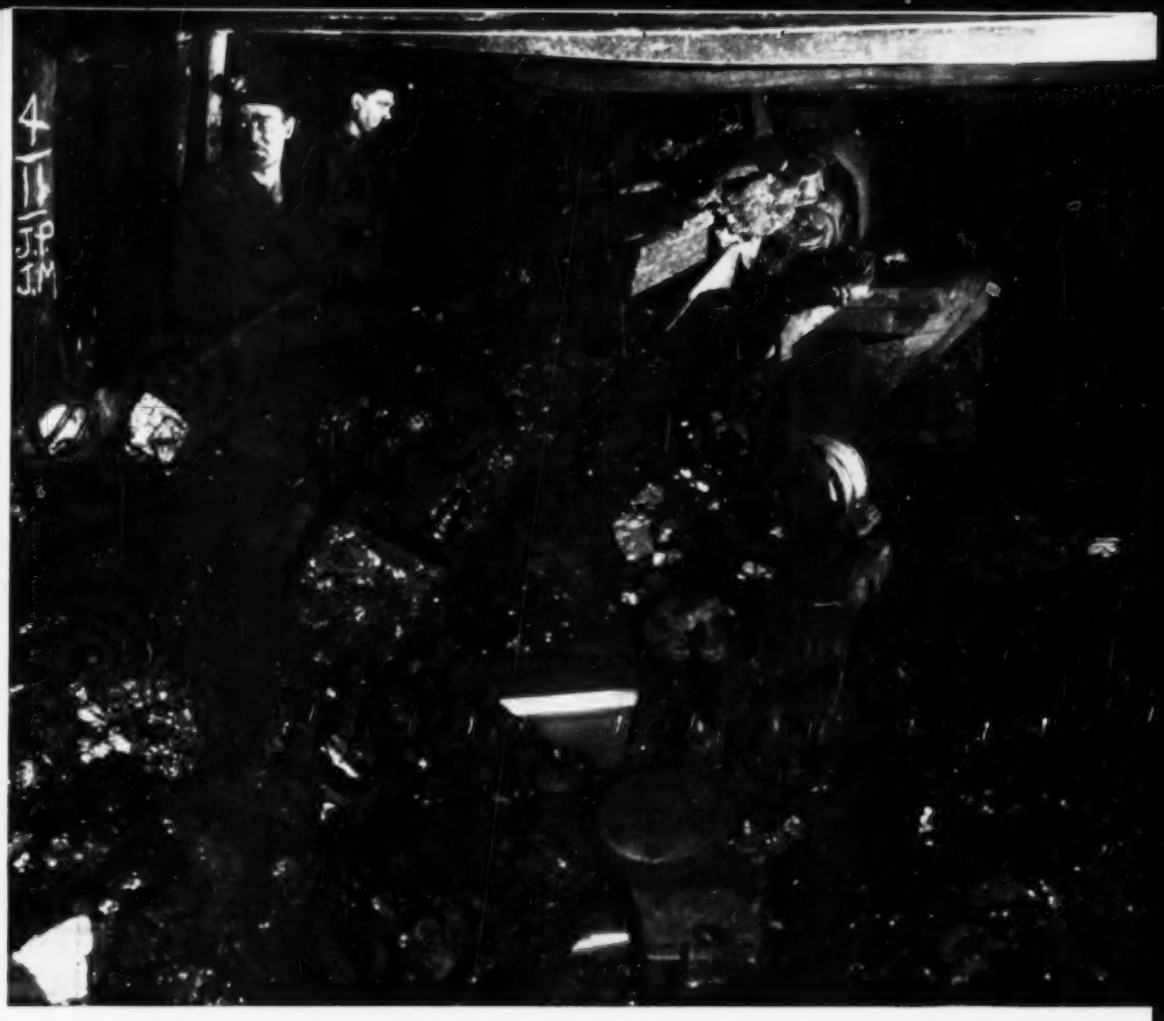
JOY, the *pioneer* in modern methods of high-production trackless mining, builds compact, highly efficient machines for every mining condition. • Let us help *you* to increase tonnage and reduce costs...
WRITE FOR INFORMATION.



The JOY 14-BU Loader, for heavy-duty, high-production loading. Having an over-all height of only 30½ inches, the 14-BU operates efficiently in seams as low as 34 inches, with a capacity of 5 to 8 tons per minute.



The JOY 42-D Shuttle Car, for fast, high-tonnage moving in medium seams. Available either battery-powered or by hydraulically-controlled cable reel, and with a hydraulic adjustable elevated discharge, if desired.



For higher tonnage and lower costs

Consult a Joy Engineer

WAD CL2069

JOY MANUFACTURING COMPANY

GENERAL OFFICES: HENRY W. OLIVER BUILDING · PITTSBURGH 22, PA.

IN CANADA: JOY MANUFACTURING COMPANY (CANADA) LIMITED, GALT, ONTARIO

How PRIMACORD helps boost stripping

The use of Primacord boosts stripping tonnage by initiating explosive charges to produce well-broken ground. And well broken ground keeps shovels digging . . . trucks moving . . . with pay-dirt in every load.

Here's how: You *plan* trunk line hookups with Primacord so that front holes go a split-second before succeeding holes. The resulting relief of burden *boosts fragmentation.*

Primacord down-hole branch lines are in contact with the entire charge. When you fire, every dynamite cartridge explodes with the power of a primer cartridge . . . *boosting fragmentation.*

Insensitive to stray currents, Primacord is the logical detonator to use wherever high-voltage electrical equipment is on the job. Flexible, easy to handle, Primacord hooks up quickly with square knots and half-hitches . . . comes wound on lightweight spools that speed up loading operations.

Primacord is available in three types, designed to meet every blasting condition. Ask your supplier for the full Primacord story — or write us direct. The Ensign-Bickford Co., Simsbury, Connecticut.

P-20

PRIMACORD-BICKFORD Detonating • Fuse •

Also Ensign-Bickford Safety Fuse Since 1836

Devoted to the Operating, Technical and Business Problems of the Coal-Mining Industry

Coal Age

JANUARY, 1949

IVAN A. GIVEN, EDITOR

Still Good

WITH INDICATIONS that the final figures will show a 1948 bituminous output of between 590 and 600 million tons, compared to 630 million in 1947, and an anthracite output of around 57.7 million tons, against 57.2 tons in the previous year, it is natural to speculate on what may happen in 1949. Aside from competition, two major factors are involved: the trend in overseas exports and—perhaps the most important—the level of business activity.

Overseas exports, it may be expected, will drop still further in 1949 as production in Great Britain and Europe increases. But the indications are that a substantial tonnage still will be needed from the United States even if Great Britain and the Continent are able to attain the increases expected. Consequently, exports again will be a real factor in the 1949 picture, although down from 1948 and 1947.

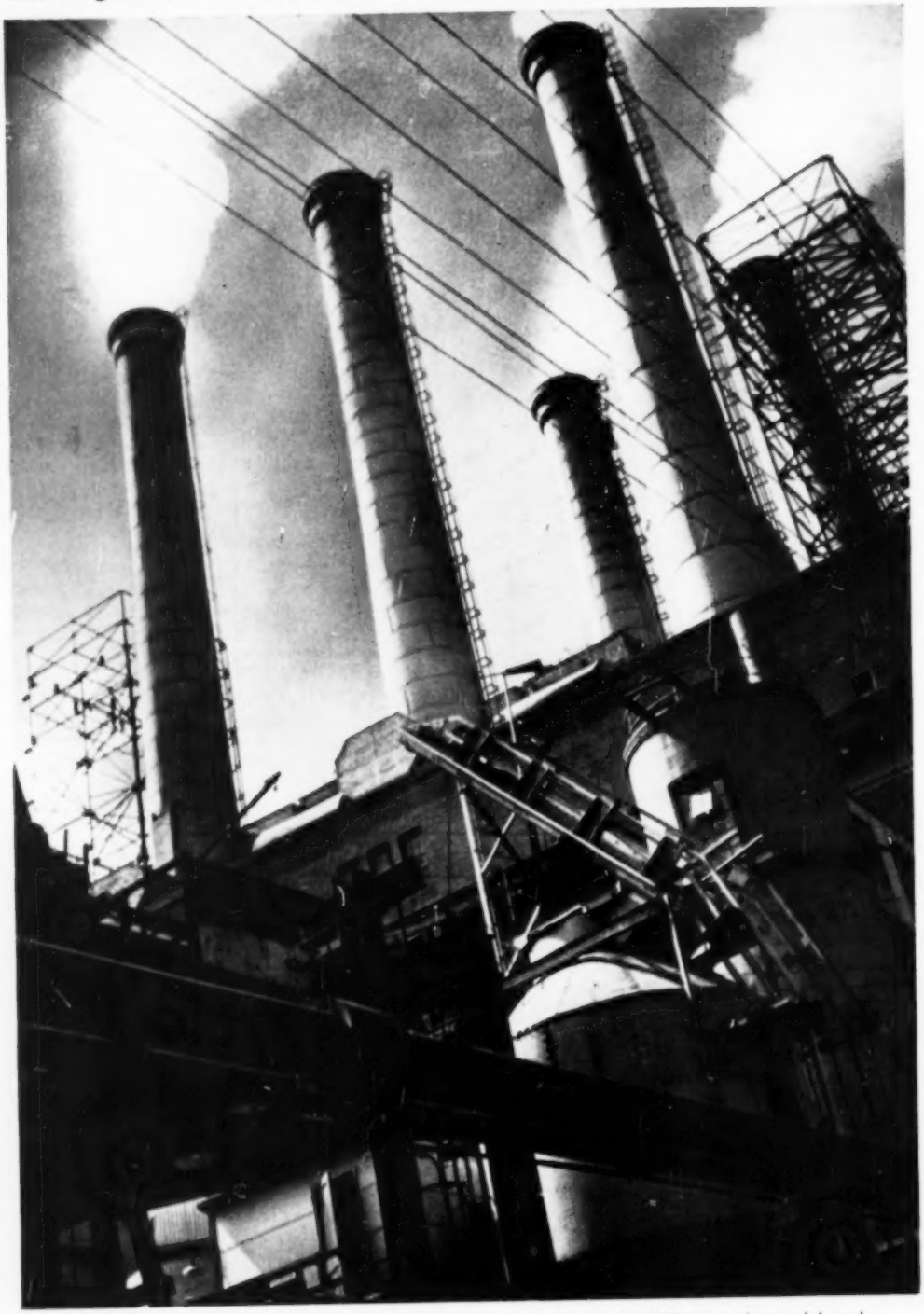
On the more-important front—business and industrial activity in the United States—the picture at the moment is one of continuation at about the same level. A McGraw-Hill survey indicates that the level of expenditures for new plant and equipment in 1949 will be very close to the 1948 level, meaning that business and industrial activity will continue to reflect this powerful stimulus. Buyer's markets have developed—or very shortly will—in many consumer-goods lines. This, however, appears to be more a reflection of increased capacity to produce rather than any substantial reduction in demand—at least so far. And in some lines, such as automobiles, production is not expected to catch up with demand for another two or three years. Personal income, according to government figures, rose to a new high last October, while some reports indicate that the proportion being saved, apparently in the expectation that prices will drop slightly as production catches up with demand, has increased. Presumably, part or all of these savings will be released in the future to maintain the level of purchasing power. Consequently, while buyer's markets have developed, they have developed at a high level of production, with the signs indicating that this level will be maintained at least through 1949.

Translated in coal production, all this means that the 1949 total should not be appreciably less than in 1948, while there is, of course, the possibility that it could be more. But if 1949 should bring rougher weather, the setback will be no more than temporary since coal, as brought out in the study of the future which follows this page, is destined to assume a larger and larger responsibility for supplying the fuel and energy needs of the nation.

Problem and Solution

FREE, PRIVATE ENTERPRISE is the keystone of the American system, which provides the highest standard of living in the world today. In spite of this, however, the system is under attack by the Communists and other self-seekers and axe-grinders. In addition, it is subject to pressures growing out of friction and misunderstanding. All this has resulted in both individual and organized attempts to explain the American system to the worker and the general public—the key factors. An outstanding example of organized effort is the program of The Advertising Council, Inc., aimed at selling the worker on cooperation through economic understanding. National advertising on this basis already is appearing, and the council stresses the importance of parallel action on a plant and community basis. Coal, as much or more as any other industry, can benefit from increased worker and community understanding. Creating such understanding, therefore, should be a No. 1 task of management.

Growing Market Demands and New Uses Add up to a Bright Future in . . .



FACT FOR COAL—Growth of electric power industry in next 12 years will add about 4,200,000 tons yearly to coal demand.

POSSIBILITY FOR COAL—Synthetic-liquid-fuel production will require major increases in output for raw materials.

Coal's New Era

Billion-Ton Anthracite and Bituminous Production Not Impossible by 1960 as a Result of Population Growth, More Home, Farm and Industrial Equipment, Greater Use of Power, Receding Competition and Fuel Synthesis

AS THE FUEL PICTURE of the future unfolds, coal's role as a supplier of energy looms larger and larger. This bright promise, undimmed by coal's old competitors—oil and natural gas—or by the threat of a new contestant—atomic energy—is shaped by a growing population, a higher standard of living with more essentials and luxuries for everybody, a booming industrial plant that even now cannot provide all the things people want, and a wider use of machine power.

The upsurge in the nation's energy needs since the war has come as a distinct surprise to some of the experts in the forecasting business. These saw in their crystal balls a decline in energy requirements and industrial output, along with mass unemployment and a business slump, as the nation settled down to peacetime living. What actually happened is pretty well known to everybody. Energy demands reached a level, in 1947, 6 percent higher than in the peak war year of 1944 and 40 percent higher than in 1940.

Coal did pretty well for itself in this period of boom in energy requirements. George H. Lamb, manager of business surveys, cites some significant figures as follows: bituminous consumption in 1947, exclusive of exports, up 120 percent from 1940; anthracite, up 12 percent; petroleum, up 47 percent; and marketed natural gas, up 67 percent.

Mr. Lamb, along with many others, believes that this upward movement will continue, with coal the odds-on favorite for greatest growth. By 1952, oil requirements are expected to reach 2,600,000,000 bbl. annually, some 740,000,000 bbl., or 39.8 percent, above 1947 output. With the supply of natural petroleum already tight and with the growing difficulty and cost of wildcatting, our nation has two choices: (1) to increase petroleum imports from South America and the Middle East, with consequent risk of interruption if we find ourselves again at war; or (2) to call on coal to shoulder a larger share of our fuel needs, both in the solid form and as a raw material for synthetic fuels.

Natural gas also, though it is reaching farther and farther for new customers, now is facing new demands by chemical and other industries close home. In this changing picture, it is likely that the distant customers may very soon find themselves in severe competition with these new chemical and synthetic plants.

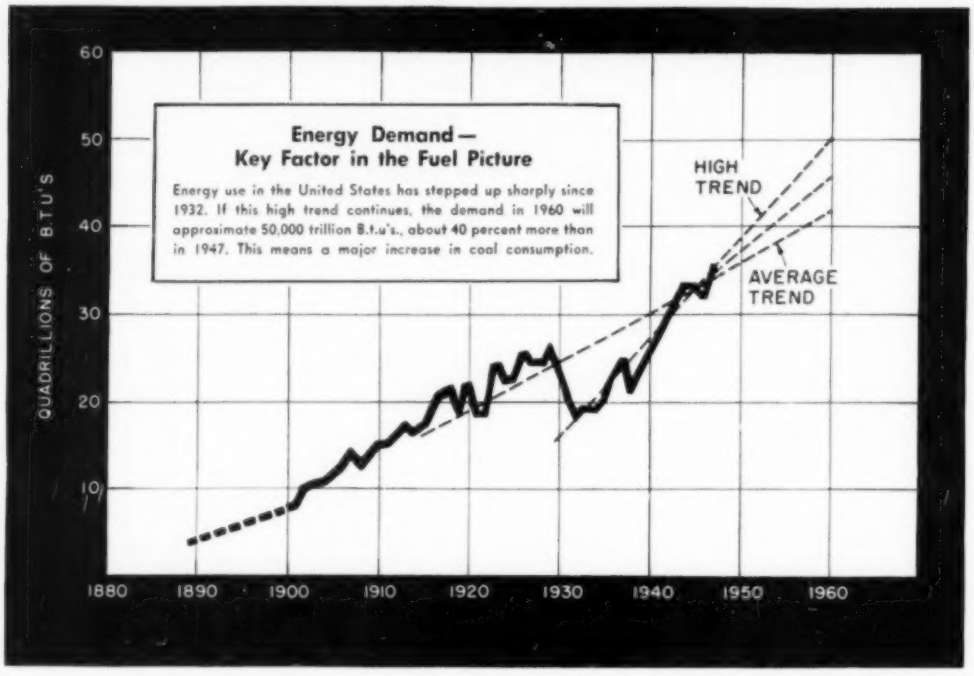
Thus, three facts add up to a rosy future for coal:

1. An expanding fuels market resulting from population increases, industrial growth and more wealth in the hands of individuals.

2. Bountiful reserves of coal close to major fuel markets.

3. Limitations on further growth by oil and natural gas.

Upward Trend in Energy Use Sets the Pace in Fuel Demands



Coal for More People

Population Growth and Higher Living Standards Basic Factors in Increasing Fuel Requirements

THE REASONS why coal tonnage will increase in the future can be documented from almost any angle. To begin with, take population. Even in 1948, there were more than 144,000,000 people living in the United States—as many as population experts, only a few years ago, predicted for 1950. For the years ahead, the U. S. Bureau of the Census forecasts population as follows: 1955, between 147,990,000 and 155,126,000; 1960, 149,827,000 to 162,011,000; 1975, 151,090,000 to 185,071,000 (Table I). The number of families, the Bureau adds, will increase from about 40,000,000 in 1948 to 42,775,000 to 47,425,000 in 1960.

Along with the growth in population, changes in life expectancy will push the percentage of older people, over 65, up from 7.2 percent of the total population in 1945 to 7.7 percent in 1950, 9.1 to 9.3 percent in 1960 and 10.7 to 11.3 percent in 1975. This means about 20,000,000 people over 65 a quarter-century hence, against about 11,000,000 at present.

At the other end of the scale, although the birth rate per thousand may possibly fall below the 1946-47 peak, the number of births per year centainly will hold steady if it does not actually increase, since there will be more thousands of people to get married and therefore more families to have babies.

The effects of this changing population picture are of major significance to coal. The more babies and youngsters there are, the more warm homes, hot-water heaters, washing machines and schools there must be. The more old people there are, the more homes that must be heated all day long and the more automatic dishwashers, electric shavers and radio and television sets in use. In the years ahead, coal will be called upon to provide a growing share of these machines and services.

These, however, are only the bare bones of the population picture. The housing shortage, a plague ever since the war ended, is likely to be troublesome for five years or more to come. In fact, our housing problem may not be fully solved before today's youngsters reach marriageable age in the middle and late 60s and thus precipitate another bulge in housing demand. All this points to a strong and rising demand for coal to make housing materials and equipment and to provide heat and electric power for home use.

Thus population growth alone means bigger tonnages for the coal industry. Assuming that the per-capita demand for coal stays where it was in the three-year period 1945-47—about 4 tons for bituminous and 0.4 tons for anthracite—and passing over, for the time being, such factors as a rise in the standard of living, new industrial processes, bigger industrial plants, increased demands for transportation, the development of a synthetic-liquid-fuels industry and the replacement of human sweat by power-driven machines, the upswing in the number of people living in the United States will require sizable increases over the 1945-47

Table I—How Population Growth Alone Will Affect Coal Requirements

Even if There Is No Change in Per-Capita Consumption

	Low Population Estimate, Thousands	Needed Coal Increase Over 1945-47 Avg. (1,000 Tons) Bit.	Anth.	Medium Population Estimate, Thousands	Needed Coal Increase Over 1945-47 Avg. (1,000 Tons) Bit.	Anth.	High Population Estimate, Thousands	Needed Coal Increase Over 1945-47 Avg. (1,000 Tons) Bit.	Anth.
1950	144,922	5,600	560	145,959	9,600	960	147,985	17,600	1,760
1955	147,990	18,000	1,800	150,911	29,600	2,960	155,126	45,400	4,640
1960	149,827	25,200	2,520	155,075	46,280	4,628	162,011	74,000	7,400
1965	151,047	30,000	3,000	159,055	62,000	6,200	169,270	102,800	10,280
1970	151,627	32,400	3,240	162,088	74,000	7,400	177,118	134,400	13,440
1975	151,090	30,400	3,040	166,069	90,240	9,240	185,071	166,000	16,600

Based on 1945-47 per-capita consumption of 4 tons for bituminous and 0.4 tons for anthracite.

average consumption, excluding exports overseas, of 553,000,000 tons of bituminous and 57,600,000 tons of anthracite.

These future increases in demand for coal, gaged by various estimates of future population, stack up as follows:

	Increase, Thousands of Tons Bituminous	Anthracite
1950	5,600- 17,600	560- 1,760
1960	25,200- 74,000	2,520- 7,400
1970	32,400-134,000	3,240-13,400

These figures show a promising outlook, even at minimum estimates, without taking any account of the upward movement in living standards. The strength behind this upward trend is suggested by the figures that follow.

In 1947, the electric utilities produced 256,000,000,000 kw.-hr. for all purposes—industrial and domestic—against 130,366,000,000 in 1939. At midsummer of 1948, the American people were eating meat at a rate of 144 lb. per person per year, compared to 132.8 lb. in 1939; buying woolen apparel fabrics at an annual rate of 590,000,000 lb., against 293,100,000 lb. in 1939; and talking into 36,500,000 telephones, against 20,831,000 in 1939.

Further confirming this boom in living standards, the Bureau of Census has estimated that in 1947 the dwelling units in the nation were 54.7 percent owner-occupied, against 43.6 percent in 1940; 67.8 percent had baths, compared with 55.7 percent in 1940 and over 90 percent had electric light, an increase of about 10 percent since 1940.

It is worth remembering that this surge in living standards took place during World War II and subsequent industrial reconversion, when consumer goods and services were in short supply. Present signs indicate that instead of leveling off in the years ahead, still higher peaks of consumption and more comforts and conveniences can be expected. Even now, three years after the end of hostilities, the automobile and telephone industries have huge backlogs of unfilled orders and the steel and meat industries are producing at a rate considerably short of demand.

Upward pressure on the standard of living comes from the fact that many people are earning more money, accept former luxuries as present necessities and can compete for goods and services though prices are at an all-time high. This reflects not only a steady rise in national income from some $71,000,000,000 in 1939 to a current rate of $221,000,000,000, but the fact that wage increases have outrun increases in the cost of living since 1939.

Higher real wages, together with better living standards and a growing population, add up to a bigger and busier industrial plant. This in turn means more business for coal, not only for heating more homes, office buildings and factories but for powering new factory capacity and new industrial processes, making the materials, tools and machines these new plants and processes need, and generating power to cut costs.

Coal for Industry

Steeply Climbing Utility Demand Paces Industrial Expansion Pushing Energy Demands Sharply Upward

TO MEET INCREASED DEMANDS for goods and services resulting from a growing population and a higher living standard, American industry generally is in the midst of a tremendous plant expansion and is installing or searching for new processes that will speed production and turn out better products.

The trend is nowhere clearer than in the electric utilities industry. Responding to a record-breaking demand for 256,000,000,000 kw.-hr. in 1947, as against 228,200,000,000 kw.-hr. in the peak war year 1944, the industry now is building or blueprinting plants and facilities that will increase the present peak load of 52,000,000 kw. at a rate of 3,000,000 kw. or more per year for the next few years. Later, building will be done at even greater speed, with capacity expected to reach 92,000,000 kw. in 1957 and 250,000,000 kw. by 1977, according to the Edison Electric Institute. The industry expects an output of 502,000,000,000 kw.-hr. in 1960, at which time its coal consumption will total 146,400,000 tons annually.

About 90 percent of these new plants are being designed to burn coal, mostly pulverized, instead of oil or natural gas. In addition, a good many utility companies, finding oil harder to get and more expensive and realizing that coal is their only dependable source of

Table II—How Coal Use Will Grow With Electric Power Expansion

	Total Kw.-Hr., Millions	Kw.-Hr. From Coal, Millions	Percent from Coal	Pounds of Coal per Kw.-Hr.	Coal Tonnage—Anthracite and Bituminous
1948	275,000	148,000	53.8	1.28	94,700,000
1949	293,000	159,000	54.2	1.25	99,400,000
1950	311,000	169,000	54.3	1.22	103,100,000
1951	321,000	179,000	54.4	1.19	106,500,000
1952	343,000	189,000	55.1	1.16	109,600,000
1953	360,000	199,000	55.2	1.13	112,400,000
1954	378,000	212,000	56.1	1.10	116,600,000
1955	397,000	223,000	56.2	1.08	120,400,000
1956	416,000	235,000	56.4	1.06	124,500,000
1957	437,000	248,000	56.7	1.04	129,000,000
1958	458,000	261,000	56.9	1.03	134,400,000
1959	481,000	274,000	57.0	1.02	139,700,000
1960	502,000	290,000	57.7	1.01	146,400,000
1961	530,000	307,000	57.9	1.00	153,500,000

Source: Edison Electric Institute.

energy in the years ahead, are redesigning oil plants to burn coal. The total anticipated effect on the coal industry is summarized in Table II, which forecasts annual kilowatt-hour output through 1961, together with power to be generated by coal, coal-to-kilowatt-hour efficiency ratio and total annual coal requirements.

The impact of this forecast on the coal industry is tremendous. For one thing, the electric-power industry soon will be coal's biggest customer, calling for 64,000,000 additional tons in 1961 above its needs in 1947, an increase of 72.7 percent. In fact, even this estimate may well be on the conservative side, for it is based on the hope that improved generating equipment and better burning efficiency will reduce coal burned per kilowatt-hour by almost one-fourth—from 1.29 lb. per kilowatt-hour in 1947 to 1.0 lb. in 1961. With the tendency of the efficiency curve to flatten out as better results are achieved and with the growing difficulty in obtaining high B.t.u. power-plant coal, it may be harder than expected to bring the ratio down to 1 lb. per kilowatt-hour.

Assuming, however, that efficiency can be improved as hoped, the rate of increase in coal tonnage needed will be about 4,200,000 tons per year, according to Edison Electric Institute figures, with coal's share in the utilities market increasing from 53.5 percent in 1947 to 57.9 percent in 1961.

One strong factor guiding the electric industry in its plan for growth is the industrial outlook. Industrial customers now account for more than half the nation's power consumption, according to F. R. Benedict, manager, industrial engineering, Westinghouse Electric Corp., who recently recited the growth in the use of electric power per worker per year, as follows: 1926, 3,841 kw.-hr.; 1929, 6,500 kw.-hr.; 1946, 8,426 kw.-hr.; and 1947, approximately 11,000 kw.-hr. Meanwhile, Mr. Benedict continued, installed horsepower per worker increased to 7.2 in 1948 against 6.4 in 1939, 4.86 in 1929 and 2.9 in 1909. In 1909, he points out, some 69 percent of this installed horsepower was mechanical, whereas in 1947, about 93 percent was electrical.

It is safe to say that the trend toward more installed horsepower and more electrification has resulted from industry's desire to produce more goods at lower prices and to offset higher wage scales with lower unit costs growing out of increased efficiencies. Even now, however, many manufacturers contend that they have only scratched the surface of a long-term program to mechanize their plants and therefore plan to increase their investments in labor-saving automatic machines and new fabricating processes.

Installation of new processes and new techniques, as well as improvement of plant working conditions by better lighting, more air conditioning and plentiful cold and hot water, also will boost power needs. In this connection, Mr. Benedict sees potential electrical needs in rapidly growing new industries and new processes as follows: welding, 3,000,000 kw., about three times present installed capacity; electric furnace brazing, 100,000 to 150,000 kw. per year, against present installations of about 50,000 kw.; induction brazing, 20,000 kw. per year; infra-red heating, 200,000 kw.; continuous annealing and electric arc furnaces for the steel industry alone, 1,500,000 kw.; resistance furnaces, 50,000 kw.; low-frequency dielectric heating, 10,000 kw. per year, twice present capacity; ore beneficiation, 1,000,000 kw.; aluminum, 3,000,000 kw., against 1,500,000 kw. at present; and magnesium, 800,000 kw., twice today's capacity.

Carrying the electric-power story still further, General Electric Co. engineers argue that nearly all modernization trends, including continuous processing, efficient materials handling, higher operating speeds, automatic controls and reduction of human error, put more demands on the electric utilities. These engineers muster a lot of facts to bolster their argument, including the following:

1. Each ton of electrolytic aluminum, finding broader markets every day, requires 20,000 kw.-hr.

2. Each ton of steel requires 200 kw.-hr.

3. Crude-petroleum pipelines totaling 72,500 miles and 18,000 miles of products pipelines now operating in the United States have 663,000 hp. of electric motors installed already. Over 90 percent of new pipelines are served electrically, consuming about 1,500,000,000 kw.-hr. per year, and more are being built or planned, as well as new lines for natural gas.

4. Use of electric power for refining crude petroleum has risen from 1.0 kw.-hr. per barrel in 1920 to 3.5 kw.-hr. in 1948. The demand for more highly refined products will shove the figure even higher.

5. The mining industry now uses 40 percent more power than it did 10 years ago, and the end is not yet in sight. Use of electricity per ton of bituminous coal, for example, has risen from 3.8 kw.-hr. in 1920 to approximately 8.0 in 1948 and there still is a long way to go toward complete mechanization. Installed power in bituminous mining stands at about 2.0 as against 7.2 for American industry as a whole. Full mechanization certainly would require at least twice the industry's present power installation and perhaps as much as three times.

6. Beneficiation of taconite ores, when processes are completely developed, will require 75 to 80 kw.-hr. per ton of concentrate.

7. Planned increases in paper production will call for an addi-

tional 600 million kw.-hr. per year in central-station load.

8. The expected increase in textiles output by 1957 will add another 700 million kw.-hr. to central-station loads.

9. Industrial heaters and devices manufactured in 1947 totaled 1,000,000 kw., meaning, at an expected 2,000 hours' use per year, an additional utility output of 2,000,000,000 kw.-hr. per year if equipment sales hold firm.

Industrial, school and commercial lighting, too, will play a big role in the future of the electric utilities. A. C. Monteith, manager, Westinghouse headquarters engineering departments, recently reported that 100,000 factories, 1,000,000 offices, 1,200,000 stores, 300,000 eating places and 250,000 gas stations are ready to improve their lighting. Most of these establishments want to increase illumination 6 to 10 times—an expansion which, using fluorescent lamps, would boost power use for lighting three to five times.

Farm Power Demand Bulks Large

On the nation's farms, power use is growing fast. How great the potential is, is indicated by the fact that there still are 2,000,000 farms without electricity, Mr. Monteith continued. Installed machinery is less than 2 hp. per farm worker, with average annual power use standing at only 2,200 kw.-hr., 700 kw.-hr. more than the average residence. Farm consumption, he argued, should approximate 8,000 kw.-hr. per year, including farm home use, and he estimates nationwide farm potential at some 40,000,000,000 kw.-hr., roughly 10 times present use.

The utilities are looking at other things, too. New and modernized homes, for example, are building up increased power loads. In 1947, about 940,000 new homes were built. The construction rate in 1948 was close to that figure and seems likely to hold through 1949 and beyond. Each new home, with its appliances, means more electric power—an average of about 1,500 kw.-hr. per year. New appliances are expected to add to this figure. To mention only a few, the following show an impressive total:

	Kw.-Hr. per Year
Electric blanket	90
Kitchen fan	96
Television set	300
Home freezer	1,500
Water heater	2,880
Washer and dryer	3,000
Home heating and cooling	10,400

The electric power industry, however, is not the only group laying plans for increased capacity. The American Iron & Steel Institute, for example, forecasts an increase in ingot capacity from 94,233,460 tons in December, 1947, to 96,428,460 tons at the end of 1949, an increase of 2,185,000 tons. At 1½ tons of coal per ton of pig iron, steel expansion at this rate will call for an additional 3,277,500 tons of coal annually by the end of 1949.

New Homes Spur Coal Demand

The home-building industry plans a million new homes per year for some time to come. Each new home, it is estimated, requires nearly 10 tons of coal to produce steel construction materials and equipment. This adds up to 10,000,000 additional tons of coal annually for the next several years. This figure, of course, takes no account of fuel requirements ranging from 5 to 15 tons of coal per year per home for heat, hot water and cooking—an annual increase of 5,000,000 to 15,000,000 additional tons of coal, or its equivalent in other fuels.

Other industries, too, are looking ahead. In fact, about the only dark spot on coal's horizon is the railroad picture—and even that may not be so dark as some prophets of doom have suggested recently. The fact is that the railroads are buying more coal now than they did in any year between 1930 and the outbreak of World War II. It will be a long time before the conventional steam locomotive is displaced by the glamorized diesel.

Yet coal men can find little comfort in the probability that Class I railroads bought upwards of 1,100,000,000 gal. of diesel fuel in 1948 against some 801,000,000 gal. in 1947 and 186,000,000 in 1942, or in the fact that between July, 1947, and July, 1948, the railroads gave up or retired 2,076 steam locomotives and increased their diesels by 1,216, including switchers and road locomotives. In the first seven months of 1948, diesels turned in 19 percent of the freight gross ton-miles and 38 percent of the passenger-train car-miles.

These are gloomy facts. It is difficult for coal's friends to discount the claims of manufacturers and users that the diesel is some five times as efficient as the reciprocating steam locomotive. The counterclaim by coal men that continued dieselization of the railroads will exhaust our oil reserves loses some of its point when spokesmen of the Electromotive Division, General Motors Corp., declare that diesel fuel consumption now is only 1 percent of total oil use in the United States; that complete dieselization of the railroads would raise fuel needs to only 256,000 bbl. daily (based on 1947 operations), a total 19,000 bbl. less than the oil now being fed into oil-burning steam locomotives and only 5 percent of over-all oil production; and that 100 percent dieselization would save the railroads $340,000,000 annually in fuel costs and $210,000,000 a year in maintenance and repair.

In the face of these claims and facts, it will be hard for coal to halt the trend to diesels. However, there is hope of slowing down the speed of conversion in the near future and stopping it completely in the more distant future. The short-term program involves quick improvement of the quality of fuel sold to railroads and in rapid development and merchandising of improvements for the conventional steam locomotive—over-fire jets, cinder disposal and better-designed grates, to mention only three.

Rail-Fuel Outlook Brighter

However, coal's best bet for eventually displacing the diesel is the coal-fired gas-turbine locomotive, which still is under development and may not reach the rails-test stage before 1952, according to latest information. Progress is steady, though, and it is predicted that final design will offer fuel savings as high as 33 percent.

Meanwhile, pending its development and availability, diesel fuel may displace coal in railroad locomotives at the rate of 10,000,000 tons per year.

Other needs, however, resulting from population growth and a booming industrial plant, are enough to guarantee a lively market for bigger tonnages of coal in the years ahead, even if coal does no more than hold its present share of the fuels market. The fact is that, with growing doubts about the ability of oil and natural gas to take on much more than they now are carrying, coal's share of the energy market will grow rather than simply hold firm, especially if other fuels move up into price brackets that widen still more the gap between themselves and coal.

Table III—Expected Fuel Requirements in 1960 if There Is No Change in Present Relationship Among the Principal Types

	High Estimate	Medium Estimate	Low Estimate
Anthracite (tons)	80,900,000	73,300,000	67,200,000
Bituminous (tons)	807,600,000	735,000,000	670,400,000
Oil (1,000 bbl.)	2,619,000	2,384,000	2,174,000
Gas (1,000 cu. ft.)	7,950,000	7,234,000	6,698,000

Table IV—How Energy From Expected Increases in Oil Production Compares With Expected Total Increase in Energy Demand

	Petroleum Availability, Medium Estimate (1,000 Bbl.)	Increase in Total National Energy Demand Over 1947 (Trillions of B.t.u.)	Energy Added to 1947 Total by Increased Oil Output (Trillions of B.t.u.)
1948	2,007,500	—300	908.8
1949	2,102,400	600	1,478.2
1950	2,188,175	1,500	1,992.9
1951	2,259,350	2,400	2,419.9
1952	2,310,450	3,200	2,726.6
1953	2,345,125	4,100	2,934.6

Coal and Competition

Coal Favored More and More Over Oil and Natural Gas by Price, Supply and Reserves Situations

HOW LONG it will be before fuel customers reverse the trend toward oil and natural gas is anybody's guess. However, if present signs can be relied upon, the reversal may come sooner than expected. Indeed, it may have started already. In 1947, the percentage of total energy supplied by solid fuels turned up after trending downward from the time oil and natural gas first offered serious competition. Whereas, in 1946, coal supplied 47.1 percent of the nation's total fuel requirements against 33 percent for oil and 15.7 percent for natural gas, in 1947 the respective percentages changed to 49.9, 32.9 and 13.3. For reasons already cited as well as still to be discussed, there is good cause to believe that the upward trend in solid-fuel use will continue.

To begin with, take the oil situation. The oil companies now are having to search farther and pay more to find new wells. According to Robert E. Wilson, chairman, Standard Oil Co. (Indiana), wildcatting costs per barrel of reserves found now are six times what they were in 1936, and the *Petroleum Data Book* (1947) asserts that the cost of finding oil in 1946 was 53.6c. per barrel against 8c. in 1935-1938. In addition, the average wildcat drilled in 1946, including dry holes, discovered only 134,000 bbl. of reserves compared with 1,388,000 bbl. in 1935.

Passing over, for the moment, the implications of these data on oil reserves, the industry's higher operating costs, together with ever-increasing demands, already have seriously affected prices. The average value of crude petroleum at East Texas wells in midsummer, 1948, was $2.65 per barrel, an increase of 88 percent over the 1946 value of $1.41. On coal's side, present average value of bituminous at the mine probably is not over $4.56, only 31 percent above the average of $3.44 in 1946.

Even if the higher burning efficiency of oil is taken into account, prices in terms of equivalent fuel value still favor coal over oil. The upshot is that a good many oil-burning power plants, railroads and other industries, if not already hit as hard as the Florida Power & Light Co., where a recent oil price boost added $1,000,000 a year to fuel costs, at least are beginning to question the economy of oil and search for a way to operate at lower cost.

As for reserves, which enable an industry to expand quickly in answer to fast-growing demands, oil cannot approach coal's strong position. In spite of new petroleum reserves discovered each year, in spite of government and consumer pressure to expand production and broaden exploration, and in spite of a supply-and-demand structure that pushes prices up to a point where exploration, though costly, still is attractive, petroleum reserves have not increased substantially in recent years.

At the end of 1947, proved reserves stood at 21,487,685,000 bbl., enough for only 11½ years at the 1947 consumption rate of 1,855,000,000 bbl. New reserves found in 1947 added a net total, after 1947 withdrawals, of only 614,125,000 bbl., or about four months' supply. There is a serious question whether the addition of four months per year to total reserves is enough to meet growing demands for oil or to provide the margin of safety needed in an unsettled world.

The natural-gas outlook is substantially the same, although the prospect is a little better in terms of known reserves, provided output does not expand as gas distributors hope it will. Proved reserves at the end of 1947 were 165.93 trillion cu. ft., enough for 29.4 years at the 1947 production rate of 5.63 trillion cu. ft. New reserves added in 1947 totaled 3.41 trillion cu. ft., 2.2 trillion less than was produced. However, extensions and revisions of estimates made in previous years added another 7.57 trillion to long-term reserves, leaving a net increase of 5.15 trillion—a little less than a year's added reserves at current production rates.

As stated, these estimates of years-ahead reserves of oil and gas are based on current rates of consumption. What happens if the nation's energy needs keep on growing?

Projection of the energy curve, which shows total energy needs in past years and indicates what is in

store for the fuels industries in the years ahead, indicates a boom in energy needs from a total of 35,000 trillion B.t.u. in 1947 to high, medium and low estimates for 1960 of 50,000 trillion, 45,500 trillion and 41,500 trillion B.t.u., respectively. If coal, oil and natural gas hold on to their present shares in the energy load, requirements in 1960, based on 1947 output in the several industries less coal exports, will be as shown in Table III.

Big Coal Needs Predicted

These estimates, of course, may well be pared down by advances in coal-burning efficiency and by wider use of the gas turbine for locomotive, marine and other power. However, even if these higher efficiencies should reduce coal requirements 10 percent, the prospect for bituminous still is bright, with totals of 726,900,000 tons for a high estimate, 661,500,000 tons for a medium estimate and 606,400,000 tons for a low estimate in 1960. In anthracite, assumption of a 10 percent increase in burning efficiency still would leave a need in 1960 for 72,000,000 tons as a high, 66,000,000 as a medium, and 60,500,000 tons as a low estimate.

These predictions, as pointed out earlier, are based on the ability of oil and natural gas to continue carrying their percentage of the 1947 fuel load. Whether the oil industry can grow as fast as the energy curve shoots up is a debatable question, even within the oil industry itself. For example, B. E. Hull, vice president, The Texas Co., warned in August, 1948, that if Middle East oil transport problems are not solved, gasoline rationing will be an accepted fact in the United States by 1951. Although he expressed some alarm at the nation's recent change in status from a net exporter to a net importer of oil, he saw little hope of reversing the export-import situation in the next several years.

Some oil-industry spokesmen, notably *The Lamp*, Esso Standard Oil Co., have predicted a need for between 2,500,000,000 and 2,600,000,000 bbl. of oil by 1952, some eight years ahead of the date for this quantity predicted by the energy curve. This would be an increase of approximately 750,000,000 bbl. over 1947 output, again throwing the spotlight on the ability of domestic production to keep up with a growing demand of these dimensions.

The Subcommittee on Long-Term Availability of the American Petroleum Institute's National Oil Policy Committee published in November, 1948, the latest estimate of what the petroleum industry would be able to produce between now and 1953. The subcommittee's medium-estimate figures, together with the increase over 1947 in B.t.u.'s provided by petroleum, are compared with the projected yearly growth in the nation's energy needs in Table IV. Over the next five years, the table indicates, while energy needs of the nation are increasing 4,100 trillion B.t.u., additional energy from petroleum increases will add up to about 2,935 trillion B.t.u.—about two-thirds of the total energy increase predicted. If natural gas and coal should divide the remaining 1,165 trillion B.t.u. equally, coal would be called on to produce about 22,156,000 more tons annually by 1953.

Other oil-industry spokesmen, however, contend that to meet bigger demands some oil, possibly as much as 300,000,000 bbl. per year, will have to come from the Middle East and South America. With demand reaching 750,000,000 bbl. annually above 1947 production by 1952, and with 300,000,000 bbl. in imports, the deficit of 450,000,000 bbl. would have to be made up by shoving domestic production up to 2,100,000,000 bbl.—a figure suggested by *The Lamp*—and getting the remainder from natural gas, oil shale and coal by synthetic processes.

Military Strength at Stake

This solution, relying considerably on imports, doubtless would be satisfactory in peacetime. If war should come, however, or even if it appears that war might come, reliance to this extent on imports would involve grave risks to national security. That is why military men, as well as many thoughtful industrialists, are urging early development of a synthetic-fuels industry capable of producing as much as 2,000,000 bbl. per day. They are persuaded that if war should break out or if we have to speed building our defenses to counter the threat of war, much of the petroleum now finding its way into power plants, factories, locomotives and home basements would have to be diverted to military uses and replaced by solid or gasified coal.

As for natural gas, its position at present seems stronger than that of petroleum. Aside from proved reserves estimated to last nearly three times as long at current consumption rates, the characteristics of natural gas make it a formidable competitor. In fact, over the long haul, coal may have more to fear from natural gas than from oil, provided chemical and other industries now locating close to major fields leave enough gas to permit distributors to push still farther into new market areas.

Between 1929 and 1947, marketed production of natural gas increased 127 percent; crude petroleum output, 84 percent; bituminous production, 16 percent. Meanwhile, between 1932 and 1948, prices of natural gas dropped 12.4 percent while bituminous prices rose 117 percent and oil prices jumped 226.7 percent. On this count alone, if no other, natural gas is in a favorable position.

Natural Gas a Growing Threat

With an eye on future markets and on present markets still unsatisfied, the natural-gas industry, with 70,000 miles of pipelines already in use, plans to spend $2,650,000,000 through 1952 for new construction, according to the *Oil & Gas Journal*. An additional $150,000,000 will be spent for facilities to mix natural and manufactured gas. Major pipeline projects now planned, authorized, under way or completed in 1948 total 19,000 miles, reaching from major fields to such far-flung markets as the southeastern states, Virginia, Maryland, New York City, Pennsylvania, Boston, Ohio, Michigan, Illinois, Wisconsin and California.

The two largest planned lines are a 1,530-mile installation from Texas to Alabama, Georgia, Florida and South Carolina and an 1,839-mile system from the Rio Grande Valley of Texas to New York City. To show how fast developments are taking shape, in the first six months of 1948 the Federal Power Commission authorized construction of 3,574 miles of new natural-gas pipelines with a daily delivery capacity of 878,000,000 cu. ft., equivalent to 36,300 tons of 13,000 B.t.u. coal.

Still and all, when stacked up against unlimited reserves and a price structure that still favors coal in many areas, the long-term outlook for natural gas is not as good as it might seem at first glance. Growing domestic and industrial demands for natural gas, as well as petroleum, may well shove oil prices still higher and reverse the downward trend in gas prices. Likewise,

the time may not be far off when oil and gas shipments will be restricted to users who cannot burn coal.

Another possible coal competitor is atomic energy. How strongly it can compete and how soon are, however, still highly speculative questions, with the indications pointing strongly to the conclusion that it will not be soon and may not be great. "It will be 10 to 20 years before atomic energy can compete with coal as a source of industrial power" is the way Dr. Lyle B. Borst, chairman, Nuclear Reaction Project, Brookhaven National Laboratory, Long Island, N. Y., put it very recently.

A second authority—Joseph E. Armstrong, director, engineering division, Chicago-Directed Operations of the Atomic Energy Commission, Argonne Laboratories—in citing some of the obstacles in the way of commercial power production from atomic energy, expressed the opinion that it will probably appear in areas into which it is uneconomical to ship coal.

The conclusion from all this is that coal must prepare itself to take on a bigger share of the energy market not only because of the growing demand for energy but for national-security reasons. The latter in particular require top speed in developing a commercial-scale synthetic-fuels industry based on coal.

Coal for Synthesis

Synthetic-Fuel Development Stimulated by Economic and Security Factors, With Coal Ahead as the Raw Material

WHILE GOVERNMENT and industry go ahead with research and pilot-plant construction looking to the development of a commercial-scale synthetic-fuels industry, the debate over whether the nation needs such an industry goes on. For example, Dr. Gustav Egloff, director of research, Universal Oil Products Co., Chicago, recently charged that the government's synthetic-fuels program is "premature" and "unnecessary," that it would consume two-thirds of present coal output (apparently he assumed that would be as difficult and costly for coal to expand capacity as oil), that the necessary plants would cost far more than official government estimates of $8 to $9 billion and that the 16,000,000 tons of steel required "could be more profitably used by the oil industry." Anyhow, there has never been a real shortage in the history of the oil industry, he contended.

On the other hand, some oil-company spokesmen, government officials and coal interests are backing the development of a synthetic-fuels industry both by public statements and by laboratory research and construction of pilot plants. For example, basing their claims on results of laboratory work thus far, scientists of the Central Experiment Station, U. S. Bureau of Mines, Pittsburgh, stated in April, 1948, that heavy fuel oil from coal now can match natural heavy fuel oil in cost in some parts of the country. They also pointed out that short supplies of such fuels and higher costs of discovery, refining and marketing have narrowed the retail-price differential between petroleum fuels and bunker oils made from coal by hydrogenation.

Already having made big strides in research for converting natural gas into gasoline, Stanolind, a subsidiary of Standard Oil Co. of Indiana, now is building an oil-from-gas plant at Brownsville, Tex., and only recently, because of high construction costs, temporarily shelved plans for an $80 million synthetic-oil plant at Garden City, Kan. However, there is a catch in reliance on natural gas as a raw material for synthetic fuels. Natural gas exists in only a few places in the great quantities needed to keep a synthesis plant going long enough to justify the large capital investment. This fact naturally limits the number of plants that can be built to change natural gas to oil.

In the Pittsburgh area, the Pittsburgh Consolidation Coal Co. and the Standard Oil Development Co. are going ahead rapidly with pilot-plant operation to make fuel gas for heating and synthesis gas for conversion of coal to oil, gasoline and other products. In this connection, P. C. Keith, president, Hydrocarbon Research, Inc., New York City, recently estimated that rather than shipping the coal it would be cheaper to convert coal to gas in a favorable location, such as the Pittsburgh area, even though the heat value of the gas is only 60 per cent that of coal, and transport the gas through pipe lines to New York and New England.

To speed government work in synthetic-fuels research and development, Congress has appropriated $30,000,000 and authorized an additional $30,000,000 for the construction of demonstration and pilot plants working on coal, lignite and oil shale. Thus far, the Bureau has built Fischer-Tropsch and hydrogenation pilot plants at Bruceton, Pa., and a hydrogenation demonstration plant at Louisiana, Mo., to make gasoline and oil from coal, and a demonstration plant at Rifle, Colo., to make oil and gasoline from oil shale. A Fischer-Tropsch demonstration plant still is under construction at Louisiana, Mo. Under the same government program, research into better ways of making synthesis gas is under way at Morgantown, W. Va., and is being supplemented by laboratory work in Bureau stations at Pittsburgh, Pa.; Golden, Colo.; and Grand Forks, N. D. It is a good bet that Congress will continue to appropriate whatever funds may be needed.

E. V. Murphree, president, Standard Oil Development Co., in testimony March, 1948, before the oil subcommittee of the House Armed Services Committee, pointed out that capital and operating costs for synthetic-fuels production favor natural gas and oil shale as raw materials. Although improvements in gasification—the first step in coal synthesis — were yet to be thoroughly confirmed at the time, his estimates were that with crude oil at $2.78 a barrel, natural gas at 10c. per 1,000 cu.ft., coal in the East at $3.20 per ton and oil shale at $1 per ton, gasoline could be produced at the following costs: from crude, 14.1c. per gallon; natural gas, 12.8c.; coal, 16.6c.; and oil shale, 16.0c.

Other cost estimates, although they do not agree in all details with Mr. Murphree's analysis, suggest much the same conclusions. For example, R. C. Alden, Phillips Petroleum Co., estimated in April, 1948, that synthetic gasoline from natural gas was rapidly approaching economic competition with crude-oil gasoline, with indications that the natural-gas product could be made available at only 3c. per

gallon over gasoline from crude oil.

The investment in a plant for producing 650,000 bbl. of gasoline daily from coal would, he declared, be $5,200,000,000, compared to $2,600,000,000 for a natural-gas synthesis plant of the same capacity. On the other hand, he warned that today's natural-gas reserves would make about 25 billion bbl. of gasoline, or enough for about 13 years on the basis of current demand. However, coal reserves suitable for the process could supply about 4,700,000,000,000 bbl. of gasoline, or enough for several thousand years. "It is therefore evident," he concluded, "that any long-range liquid-fuels program must be based on coal."

Cost estimates along the same lines recently have been derived from theoretical studies by Bureau of Mines experts, who report that the Fischer-Tropsch synthesis process probably can produce 90 percent gasoline and 10 percent heavier products from coal at a cost of 12.4c. per gallon of total products. Coal-hydrogenation products consisting of 16 percent liquid petroleum gases, 42 percent gasoline and 42 percent diesel oil are estimated at 12.6c. per gallon of total products.

Aviation Fuel Not Too Costly

Hydrogenation of coal also could turn out a heavy fuel oil for about 10c. per gallon or up to 89.9 percent aviation gasoline and aviation base stock for 15.5c. per gallon. These data, according to the Bureau, include all costs with annual depreciation at 6.67 percent of total investment but do not include a return on investment and make no allowance for byproduct credits from tars, resins, carbon dioxide and so on.

Coal's reserve situation and the proximity of these reserves to major consuming areas, plus a change in the cost pattern favoring coal, could, therefore, very easily bring coal into commercial competition with natural gas and oil shale as a raw material for synthesis. With an increase of only 56c. per barrel over the $3 price offered by the Phillips Petroleum Co. in November, 1948, for crude oil at the well, and with coal selling at $3.20 per ton at the mine, gasoline from crude and from coal would be competitively priced.

It must be admitted that the conversion of coal to oil is wasteful from the standpoint of energy conservation. In heat content, a ton of coal equals about 4 bbl. of oil but in converting coal to oil by known processes, about half the heat content is lost. Whether our natural reserves of energy can permit such prodigal waste is certainly open to some question. Mr. Lamb points out that it would be difficult to justify this vast waste of energy simply to burn coal as oil under boilers. There now are several hundred million barrels of oil burned under boilers in the northern industrial states, he contends, that can readily be displaced by coal, freeing the oil for more appropriate and indispensable uses. The cost of equipping these plants to burn solid fuel instead of oil would be negligible compared to the cost of building synthesis plants to supply them with oil from coal — some $2,500,000,000, he estimates.

Solid Fuel Still to Be Burned

The conclusion is plain: It will not be sound business, to say nothing of sound conservation, to burn synthetic gaseous or liquid fuel where solid fuel can be made to fill the need. In fact, simple economic necessity or even military need may force voluntary industry allocations or government distribution controls on natural petroleum products in the foreseeable future, thus driving a good many fuel users to coal, perhaps unwillingly but none the less effectively.

As for possible military needs, Secretary of Defense Forrestal, in February, 1948, warned that if war should come the armed forces would need 2,000,000 bbl. of oil per day and asked that synthetic-fuel plants be built to that measure, utilizing natural gas, oil shale and coal.

Roughly, a ton of coal will produce about 2 bbl. of synthetic oil. Assuming that only half of Secretary Forrestal's 2,000,000-bbl. figure might be made from coal and the remainder from natural gas and oil shale, a synthetic-fuels industry would require 91,250,000 tons of coal annually to supply military needs alone.

Civilian needs for oil, like military needs, also must be counted in any estimate of future synthetic-fuels demand. The consensus is that the petroleum industry cannot fill growing demands for oil over the long pull and that coal, either as a solid, a gas or a liquid, will have to shoulder more and more of the growing energy market. One symptom of industry's growing recognition of this fact, as pointed out earlier, is the plan of the electric utilities to boost coal's share in power production from 53.8 percent in 1948 to 57.7 percent in 1960. Also, there is reason to expect a reversal of the railroads' trend to diesel-electric power when the coal-fired gas-turbine locomotive becomes available.

Aside from coal-to-oil switchovers like these, which probably will add materially to coal's markets, high demand for oil, coupled with a slowdown in oil's rate-of-growth and rising prices, may well speed the growth of a synthetic-fuels industry in the face of doubtful economics. Admittedly, costs will be high at the start and full-scale development doubtless should not be undertaken until laboratory research, pilot-plant operation and careful study of the economics of fuel supply and needs have been completed. But the fact remains—there will be a synthetic-fuels industry of considerable size and coal is destined to share in its development and to provide a considerable part of its raw-material needs.

Coal's Position Stronger

If, as is shown by the steepest projection of the energy curve, we should need 2,619,000,000 bbl. of oil in 1960 (at present rates of growth, even this figure seems to be a conservative estimate), an additional 592,520,000 bbl. of oil per year would be needed above the 1948 production rate, now running at 2,026,480,000 bbl. Whether the petroleum industry can grow to this measure—29 percent above its present size—is doubtful. Assuming that it can boost its output from crude petroleum to fill half the additional needs and that the remaining half can be divided equally between coal on the one hand and oil shale and natural gas on the other, 74,065,000 additional tons of coal would be needed by 1960 for synthetic-fuels production.

From all this, the conclusion must be that coal will supply a larger and larger share of the nation's fuel requirements, not only in the more-distant future but immediately. The inexorable upward trend in the energy curve, reflecting growing population, increasing wealth in the hands of individuals and ever-growing industrial activity, means that more and more fuel must be provided. Coal has its difficulties in certain directions, but from the standpoints of reserves, availability and cost it is in the best position of all fuels to expand—and expand substantially. Over all, its future is truly bright.

FINAL PASS WITH SAWBILL to clean up a heading face. This loading device gets 90 percent of the coal without shoveling.

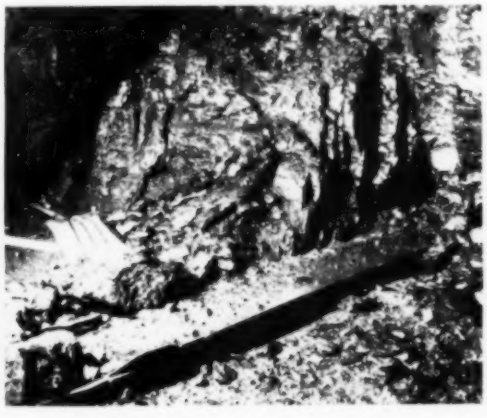
Modernization at Champion

Better Coal and Better Service to Customers Accompany Substantial Increase in Efficiency as a Result of Preparation Reconstruction and the Adoption of Conveyor Mining and Belt Haulage at Hawk's Nest Mine

A COMPLETE REVISION of mining and preparation since the summer of 1946 has put the Hawk's Nest mine of the Champion Coal Mining Co., Somerset, Colo., in the mechanized class and has made it possible for it to offer its patrons a better product and better service. Presently selling "Colorado's lowest-ash domestic coal" directly to truckers or hauling it approximately one mile to a loading ramp at rail head, the Champion organization has designed its new plant for easy installation of railroad loading tracks in the future if the present Denver & Rio Grande Western branch from Delta to Oliver is extended.

Following previous experience in management and operation, the Champion company and Hawk's Nest mine were taken over completely by Clement Audin Sr. in

CUTTING IN A PILLAR next to the gob in a working room.



CLOSE-UP OF SAWBILL cleaning up a heading face.

MAKING LUMP, NUT AND STOKER-SLACK, this new Hawk's Nest plant is designed for later installation of railroad tracks.

1943. Mr. Audin also serves as superintendent and is assisted in operating the property by his sons, Ralph Audin, master mechanic and vice president; Abel Audin, mine foreman and secretary; and Clement Audin Jr., outside foreman and treasurer.

Production comes from the Hawk's Nest seam in the West Elk mountains of Colorado. Thickness in the present location is approximately 8 ft., exclusive of 27 in. of top coal followed by sandy shale. The seam is clean and pitches about 4½ percent north.

Prior to the relocation and mechanization program begun in 1946, the property was served by a mine-car slope. Loading was by hand and mules and a Goodman battery locomotive were used for haulage. Production was 100 to 175 tons per day with an average of 24 men working. Part of the coal (about 25 percent) was sold at the tipple and the remainder trucked to the railroad loading ramp 1½ miles away.

In the reconstruction program, a new belt slope was sunk in the middle of the property and a new preparation plant was constructed a quarter of a mile down the canyon from the previous location. The move to the new location was made in July, 1947, and the first coal, sold to Tom McMahon, of Silverton, was loaded Aug. 6. The new opening, in addition to reducing the haul to the ramp a quarter of a mile, cut the haul in the mine a half a mile. Other advantages included a better roof and cleaner coal. Improved top conditions and production with shakers and sawbill loaders, plus belt haulage to the surface, have made it possible to produce 175 to 225 tons per shift with an average of 17 men inside and outside.

The new slope serving the property is partly in coal and partly in rock and was raised from the old works inside. The coal section consists of two headings 12 ft. wide on 50-ft. centers, protected on each side by 100-ft. pillars. Length of

ROOM SHAKER DISCHARGING to 26-in. entry belt.

DRIVEN IN ROCK, the new belt slope is on a 21-percent pitch.

Management and Methods Back up Modern Equipment at Hawk's Nest

CHAMPION OPERATORS—Abel Audin (left), mine foreman; Ralph Audin, master mechanic; Clement Audin Jr., outside foreman; Alvin Azeleson, clerk; and Clement Audin Sr., president and general superintendent.

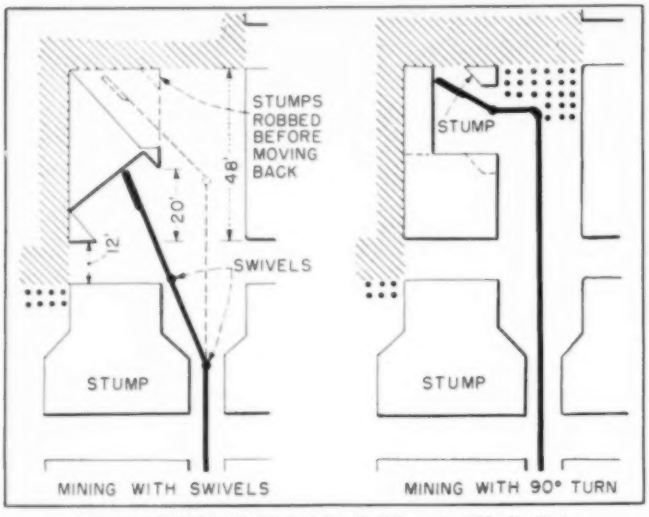


FIG. 1—STANDARD PILLAR-MINING PLANS used at Hawk's Nest.

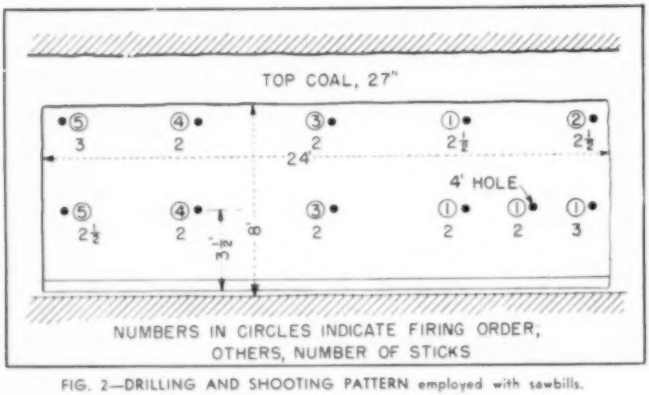


FIG. 2—DRILLING AND SHOOTING PATTERN employed with sawbills.

the rock section in which the belt is installed is 307 ft. on a 21-percent grade. It was driven approximately 8 ft. wide and 8 ft. high through sandy shale. Work started April 12 and continued every day but Sundays until the slope broke through to the surface July 15. The schedule was two men drilling at night and two mucking during the day. The material was shot on flat plates and then was shoveled into cars, which were placed and removed with mules and unloaded by hand in an abandoned room. Firm strata made timbering unnecessary, except for the necessary sets at the portal.

A second opening 7x8 ft. and 150 ft. long on a 46-percent pitch was driven as a fanway and also for use in moving heavy equipment into and out of the mine. The fan is a 5-ft. Joy Axivane unit operating exhausting. Presently driven by a 15-hp. explosion-proof motor with V-belt connection, the fan, operating at 1,080 r.p.m., is pulling 37,000 c.f.m. into the mine and exhausting 42,000 at a ½-in. water gage. The fan housing is cinder blocks and similar blocks are used for all permanent stoppings in the mine.

A Ladel conveyor large enough for a 32-in. belt was installed in the slope. Including the section leading into the tipple, present length is 800 ft. The original 26-in. Republic belt has been replaced with a 32-in. belt already on hand. Until the slope and belt are extended to open new entries down the pitch, the belt will be driven by the present 25-hp. motor. With a speed of 150 f.p.m., the unit can easily move 500 tons per shift which, at the existing pro-

POSITIONED OVER THE BINS, this screen makes lump, nut and stoker-slack.

duction rate, provides ample reserve capacity.

Mining at the time this article was prepared was concentrated in a belt entry (26-in. Ladel conveyor, also with Republic belt) turned to the left off the slope. This new entry lies below an old one and pillar extraction includes driving across and removing the stumps and chain pillars left along this old opening. In working new entries, however, all stumps and chain pillars will be pulled clean on final retreat and consequently will not have to be worked from below.

The distance from the slope to the property line on the left is approximately 2,640 ft., which also will be about the ultimate length of the 26-in. gathering belt. While a second unit may be installed on the right to square up and mine out chain pillars and stumps still standing on that side, the plan is to work down the left side and then complete the job by retreating back up on the right.

Production entries, in which the gathering belt or belts are installed, consist of two headings 12 ft. wide on 65-ft. centers. Rooms are driven and the pillars are pulled down to the stumps on the advance and in step with entry driving. Room and entry equipment consists of one Goodman G12½ and four Ladel U12½ shakers, each equipped with a sawbill made at the mine. Two shakers normally are used in driving headings and three in driving rooms and pulling pillars. An entry unit therefore consists of the 26-in. gathering belt and five shakers. Each shaker is equipped with a sawbill and is accompanied by a Sullivan CE7 shortwall with 6½- or 7½-ft. bar (Bowdil chains and bits) and a Little Giant hand-held drill (McLaughlin heads and bits). Two men in each place timber and load. Cutting and drilling, however, are done by a roving crew of two men, who move from place to place as necessary, and a certified shotfirer does all the shooting.

Rooms are necked 10 ft. wide for a distance of about three cuts and then are driven 24 ft. wide on 50-ft. centers. Depth is approximately 300 ft. and the places naturally are worked up the pitch. Crosscut width is 14 ft. and the first is made 50 ft. in, with those that follow on 60-ft. centers. Two 45-deg. swivels or a 90-deg. turn are used to drive the crosscuts.

The usual pillaring methods with swivels and 90-deg. turns are shown diagrammatically in Fig. 1. When the equipment arrives, 90-deg. turns will be used exclusively in crosscut driving and pillar work. In present swivel work, however, a pillar is mined by starting about 20 ft. from the end and driving diagonally across the corner, using one swivel. Then, the remainder of the pillar is extracted head on as shown, using two swivels to get past the corner of the next pillar outby. With the 90-deg. turn, a pillar is mined (Fig. 1) by cutting across the end, gripping out to remove all the coal after the first cut and leaving a stump about 6 ft. thick on the corner. After the first lift is completed, the 6-ft. stump is robbed, the conveyor is shortened and the same process is repeated to complete pillar extraction. Double rows of posts about 4 ft. apart are set against the caved area during pillar mining. As noted, pillars in rooms are pulled down to the stumps and then, when the entry has advanced to its limit, the stumps and chain pillars will be mined on the retreat.

Since the coal is hard, it must be shot fairly heavily. The drilling and loading diagram normally employed in rooms, which make about 44 tons per fall, is shown in Fig. 2. The coal-breaking medium is 60-percent Monobel E permissible in 1½x8-in. sticks, and an average of 25½ sticks are used in a 24-ft. room.

The second hole from the right in the bottom row is drilled short—about 4 ft. deep—to assist in breaking into the cut. Before shooting, the sawbill is run about 3 ft. under the cut and four holes, including the short one, are shot simultaneously, followed by the others in the order shown. Working from right to left, the sawbill loads the front half of the cut. It then is moved back and extended and the back half is loaded. Two passes are necessary because running the sawbill all the way under the cut and shooting on it would result in wedging and leaving of coal in the back. The sawbill gets in the corners well and loads about 90 percent of the coal without shoveling.

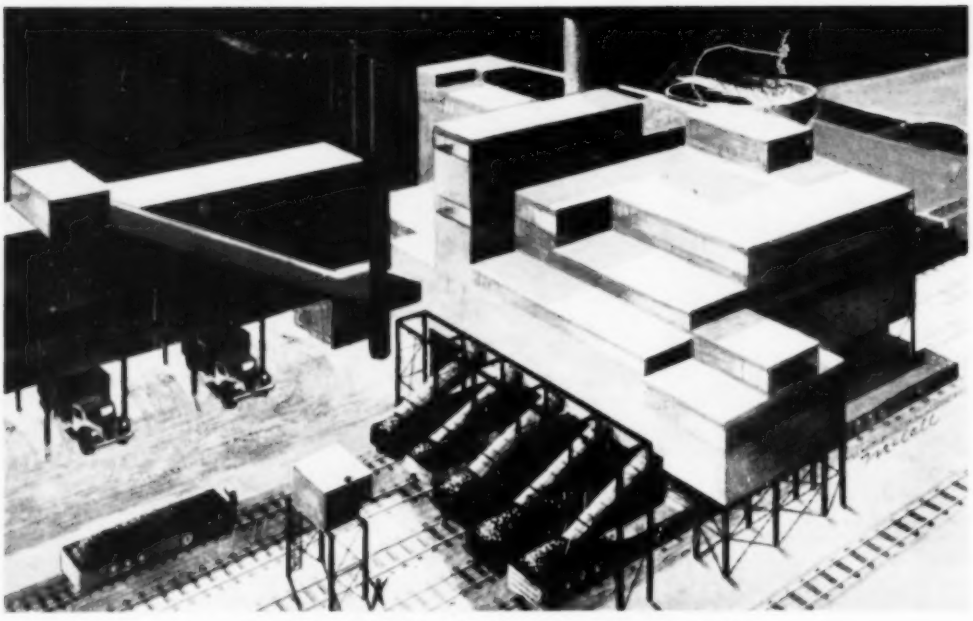
Two rows of posts on 6-ft. centers are set on each side of the conveyor in rooms and are kept to within 8 ft. of the face. In addition, safety posts are used at the face, both room and safety posts being removed and reset as the sawbill traverses the place. In the future, jacks and crossbars will be used in the face zone.

Water Lines Serve Workings

Shots at Hawk's Nest are stemmed with adobe. Rock dusting is done with an M-S-A skid-mounted duster and water lines are laid into every working place. Water is used on the cutter bar, all faces are washed down before shooting and loose coal is sprinkled after shooting and during loading. Supplies are brought to the working places by reversing the belts. As previously noted, heavy machinery is skidded down the fanway, using a small Sullivan hoist. A crawler-type shortwall truck will be installed for moving shaker drives and other heavy units.

Power is purchased at 11,000 volts and transformed down to 2,300 for transmission underground and 440 for outside use. Marine cable is used for taking 2,300 volts underground. All equipment is operated on 220 volts a.c., supplied by 15-kva. transformers in cars, three per bank. A solid ground is carried back from all equipment through the cover of the marine cable and, via a 2 0 solid copper line, to a ground in the river below the tipple.

The new Hawk's Nest preparation plant presently is set up to prepare and load into trucks 3-in. lump, 3x1½ nut and 1½x0 stoker-slack. The slope belt now discharges directly to the main shaker, which extends across the tops of the storage and loading bins. For greater flexibility in meeting demands, plans call for installing a crusher between the belt and the screen. The lump-storage and loading bin has a capacity of over 25 tons; nut bin, 30 tons; and the stoker-slack bin, 50 to 60 tons or more. As previously noted, the tipple is laid out to facilitate installation of railroad tracks in the future if the line is extended.



HEART OF HARMATTAN—artist's view of the coal-processing plant.

Planning a New Strip Mine

How Problems of Market, Plant Location and Equipment, Including Future Use of the Site When Mining Is Completed, Were Solved in Developing the New Harmattan Strip Mine of the Fairview Collieries Corp.

By R. H. SWALLOW

Chief Engineer, Ayrshire Collieries Corp., Indianapolis, Ind.

IN DISCUSSING all that goes into the planning of a modern strip mine it is my feeling that a specific and typical project must be covered from the acquisition of the reserve to the final step of actual coal production. We shall, therefore, discuss in this article the development of our new Fairview Collieries Corp. Harmattan mine, immediately west of Danville, Ill. Fairview Collieries Corp. is a wholly owned subsidiary of the Ayrshire Collieries Corp.

The name Harmattan, meaning a "hot wind from the Sahara Desert," is descriptive of the coal to be produced. The mine location is less than two miles from the romantic "Pioneer Workings," from the beginnings of which have come today's huge strip operations.

In the late 1800s, coal was discovered almost exposed in the bottom of the north fork of the Vermilion River, west of Danville, in the region known as Hungry Hollow. It was possible to remove the light overburden in small areas by the use of wheelbarrows. This was done by enterprising individuals to obtain their winter coal supply. The neighbors, naturally, soon became interested and started buying for their own use. This brought into the picture such hardy pioneers as the Mike Kellys and others. They relied on teams and scrapers, diverting the river with spoil banks during the periods of low water and thereby enlarging the scope of their commercial, if local, operations.

In the early 1900s, a railroad-type shovel with a front-mounted boom, swinging through an arc of only 180 deg., was successfully stripping this coal under 10 to 20 ft. of overburden. These operations were a far cry from those of today, which feature 25- to 40-yd. dippers on the huge shovels and draglines which are carrying on from the humble beginnings previously summarized.

The Harmattan operation will be almost alone in this once very active coal-producing community. Not too many miles to the west are the abandoned spoil banks of the United Electric Coal Co.'s operation, later worked by the Morgan Coal Co., which took out the fringe coal. West and south of Danville, in the Catlin-Westville-Georgetown area, are the abandoned Peabody, Little Vermilion and Bunsenville mines, until recent years large producers from the Illinois No. 6 vein. There are still many small truck com-

GARAGE AND SHOP FACILITIES include permanent derrick.

UNDERPASS under empty yard shortens truck haul from pit.

panies operating both shaft and slope mines, but the large producers have been closed one by one.

The planning of Harmattan begins with the acquisition, in 1941, of approximately 2,800 acres of coal reserve immediately west of Hungry Hollow, bounded on the north by the Hungry Hollow paved road and on the south by the village of Hillery and the Hillery yards of the P. & E. Division of the New York Central System. The coal is geologically Illinois No. 7. Average thickness of the seam is 6 ft., and of the overburden, 72 ft.

The first step, of course, in the preparation of any reserve for mining is the surveying of the surface for topographical data and drilling to establish the depth of overburden, the thickness of the seam and the quality of the coal. The volume and quality of strippable coal, once known, establish in the minds of the planners certain things that are essential. The indications are that, in this instance, we have approximately a 20-year operation, depending on the unpredictables of market consumption, economic status, duration of labor difficulties—if any—and other unknown factors.

Planners must decide first of all what market they are to serve and to what extent preparation is to be carried, with the full knowledge that the quality of preparation is of vast interest to the purchasing user. It was decided to make Harmattan one of the most modern washed-coal producers possible. Today's large consumer of coal is well aware that proper sizing and preparation can mean vast savings through economical operation of his modern plant. Therefore, he is vitally interested in how the planners have gone about providing for economical and efficient coal preparation. Consequently, in cooperation with the McNally-Pittsburg organization, Harmattan's ultra-modern washing and sizing plant is now rapidly reaching the completion stage and will soon be producing the finest washed and prepared coals for its consumers.

In studying the drill logs it became apparent that there was a glacial cutout in the coal seam, so located that it was possible and feasible to place almost the entire plant, plus approximately four miles of railroad tracks, sludge pits and other necessary appurtenances, over this cutout, eliminating the usual coverage of minable coal.

The land, as previously mentioned, was acquired in 1941. Some 25 to 30 owners were involved. Part of the land was purchased outright and part was acquired under royalty contracts. Actual development was scheduled and started in April, 1946. Some unusual operations and planning were involved, but in general the procedure was based on years of experience in the field, with the aim that of producing high-grade coal as economically and efficiently as possible.

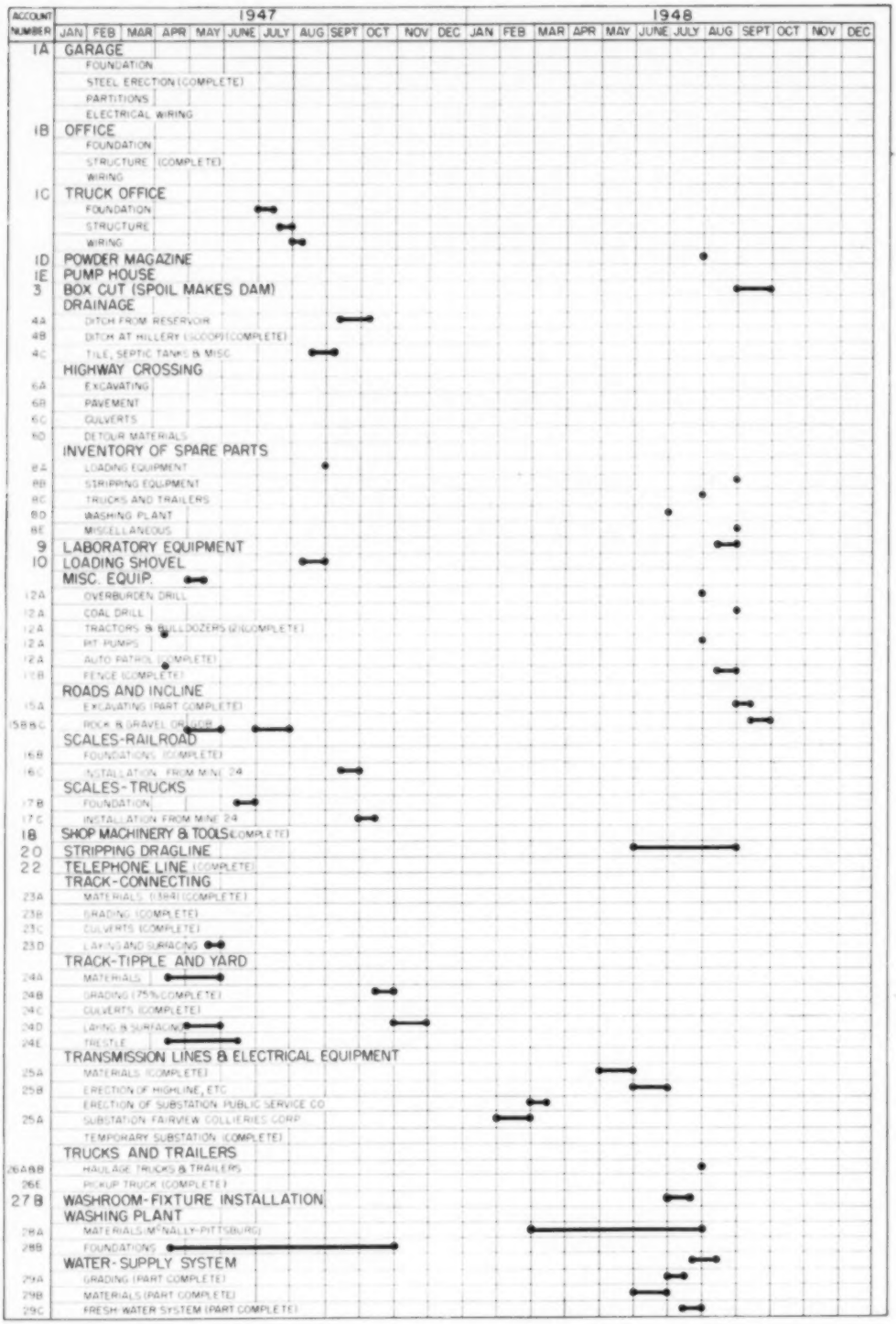
One of the unusual problems involved the moving of a century-old private cemetery. To quote from the *Danville Commercial News* of Sept. 14, 1946: "The remains of nine bodies, three of which were buried 95 years ago, were disinterred recently from an old private family cemetery located on what was formerly the old Danville Rod and Gun Club grounds, northeast of Hillery, and reburied in Oak Hill Cemetery at the top of Kistler Hill, west of Danville. The last of the nine bodies was buried in the old burial plot 68 years ago. The Callahan & Jones Funeral Home supervised the disinterment, which was done because of strip-mining activities anticipated in the area by the Ayrshire Collieries. Permission was obtained by the mining company in circuit court to rebury the bodies." There is much more to the item, but this will suffice to present the problems involved in this particular phase of planning.

The construction schedule for Harmattan mine as revised April 11, 1947, is reproduced elsewhere in this article. It will be noted that many of the items, such as the garage, office, some of the machinery, transmission lines, etc., are shown as completed or part completed in the first year of development. During the early stage of development, and prior to the erection of the buildings indicated, the office was maintained in a small cottage immediately west of the present plant site and formerly occupied by one of the landholders.

Some of the first equipment unloaded on the grounds included a Caterpillar bulldozer, another Caterpillar tractor with a Bucyrus-Erie scraper and a small P. & H. dragline for the immediate purpose of grading roads, digging surface ditches, grading the railroad lead-in, etc. The railroad lead takes off directly from the Hillery yards, with switching connections to the Wabash, C. & E. I., Big Four and Illinois Terminal railroads.

The railroad lead comes into the plant site on a 10-deg. curve and extends beyond the plant to a graded hump where the storage tracks for empties are laid. Empties are switched back to the various

Construction Schedule—Harmattan Mine



loading tracks, down through under the plant and over the railroad scales, which are immediately to the rear of the main office building housing the scale beam and weighmaster's office, and from there to the load storage tracks, by gravity. Immediately north, across the newly graded and surfaced wide public road into the mine, is the truck scale office, with the main garage immediately to the east.

Old Deep-Mine Plant Salvaged

Early in the planning stage the old Peabody deep-mine plant was purchased and dismantled, much of the steel structure being salvaged for re-use in the large garage building and other secondary structures. Part of the salvage was a 60,000-gal. settling cone which has been incorporated in the new processing plant. The old gob pile was inherited with the plant and "red dog" from this gob pile was used as ballast for the public and truck roads and railroad lead-in, as well as the hump tracks, tipple tracks and other sidings. The "red dog," of course, was followed by a top dressing of crushed stone and gravel for finished surfaces. In an operation of this kind one of the first things, naturally, is to establish the railroad connection and construct sufficient sidings to take care of the influx of plant and equipment on cars.

The general drainage problem was met by surface ditches emptying into the nearby ravines of the Hungry Hollow area and through this channel to the Little Vermilion River. Drainage ditches and spillway outlets required the moving of 206,000 cu.yd. of material. The preliminary grading for plant, track and buildings, including the excavation of the foundations for the washing plant and tipple, the pit for the 200-ton hopper which receives the raw mine-run from the haulage trucks, the refuse and sludge pits, and the building of the reservoir dam to hold fresh water, required the moving of 213,000 cu.yd. of dirt. Much of this was used in building the empty storage yards on the hump itself. The opening of the incline to carry the loading shovel to the surface of the coal required 210,000 cu.yd. of earth cut and an additional 414,000 cu.yd. was removed from the initial box cut in uncovering the first coal.

Some of the highlights of the 1946 season preceding the period shown in the construction schedule and progress chart were as follows:

1A—Garage. This building is a large concrete-block structure which will house the haulage trucks, tractors, the repair shops, maintenance shops, electrical shop, a very modern chemical laboratory, and the storeroom with all supplies and maintenance equipment for the mine.

1B—Office, covered previously in this article.

4B—Drainage ditch at Hillery, constructed with a dragline.

12A—Unloading and operation of the tractors, bulldozer and auto patrol; also fencing.

15A—Partial completion of excavation; completion of the foundations for the railroad scales (16B).

18—Shop machinery and tools, housed, of course, in the 1A structure (the garage) in place or completed.

22—Telephone line completed. The connecting track, previously discussed, also was completed in 1946, with the laying and surfacing of the lead-in track scheduled for completion in May, 1947.

How later items fit into the overall plan and the scheduled dates for completion also are shown in the chart. In most instances they went in on schedule.

Underpass Cuts Truck Haulage

In building the hump to the empty storage yards an underpass was provided for the haulage trucks, eliminating a long bypass route which would have considerably increased the distance traveled with the coal. This is typical of the necessary advance thinking involved in an operation of this size. In building the lead-in from the railroad to the mine it was necessary to cut through the old Hillery-Batestown pavement and install a standard highway crossing, which involved the items under that heading of excavating, repaving, construction and detour materials. This work was done by a local highway construction firm equipped for that type of construction.

An interesting sidelight is the fact that the great majority of the items involved in the actual construction of the mine were handled by our own forces, using regular mine workers, even to the pouring of concrete, steel erection and all of the other typical phases of construction. This eliminated any possibility of jurisdictional disputes, and the ultimate operating force will be picked from the men who built the mine. The connecting track to the mine from the railroad yards was well under way in August, 1946, as were the drainage ditches, steel work for the garage, the load yard and hump grading, foundations for the office and scale pit, and many other preliminary operations. In September, 1946, the public road and garage building were much farther along, as were many of the other office structures and foundations, the work going on through the winter with the foundations for the tipple and washing plant coming up out of the ground.

By June, 1947, the underpass structure for the haulage road underneath the hump tracks was well under way, and most of the substructures and foundations were nearing completion. The brick office building, which houses the general office and railroad scale office, was complete. In August, 1947, the final surfacing of the railroad tracks and the main highway road into the mine were well under way.

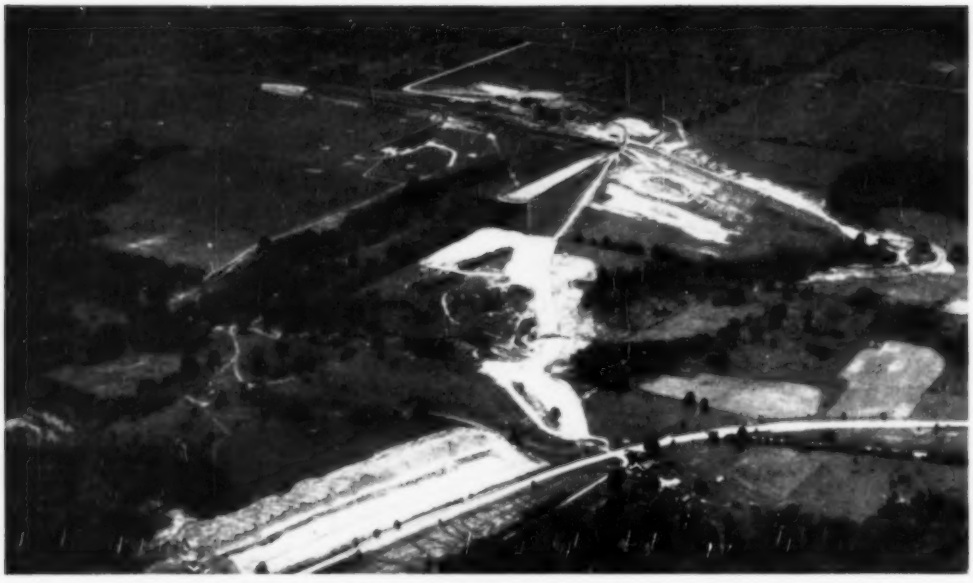
Shovel Does Double Duty

The 6-yd. Marion coal-loading shovel, which was to be used for much of the heavy preliminary excavation, reached the final erection stage in August, 1947. The permanent guy derrick immediately in front of the big garage building had been erected for use throughout the mine life.

The loading shovel was not immediately equipped as such. Instead, a 100-ft. dragline boom and a $3\frac{1}{2}$-yd. bucket were purchased and mounted on the unit for the heavy excavation for the raw-coal hopper and tunnel for the conveyor carrying the coal to the tipple. In addition, this rig was used to dig the main drainage ditch along the southeast side of the property from the reservoir spillway and for much of the heavy erection work around the property. The steel framework for the truck-loading bins was under way and the six truck bins themselves were in place by November, 1947. The excavation for the hopper pit, carried on with the Marion dragline, was well under way at that time, as were the tipple foundations and the steel work to receive the large cone. The forming and concreting of the huge hopper pit were carried on through the winter months and were rapidly approaching ground level by February, 1948.

By May 15, 1948, the steel cone was nearing the completion stage, and the concrete silo for the dissipation of the gases from the dryers in the washing plant had been com-

Harmattan Operation Reflects Effective Long-Range Planning



HARMATTAN MINE from the air, with the preparation plant in the upper center.

RATCHET-LEVER HOISTS speed construction at Harmattan.

pleted. Incidentally, this concrete silo, which is 11 ft. in diameter and approximately 75 ft. high, is one of the few projects carried on by an outside contractor, the Heinie Chimney Co., of Chicago. Construction involved the use of movable forms and continuous pouring of concrete after starting. The raw-coal hopper was complete to ground level in 1948, and a start had been made on the conveyor tunnel to take the raw coal to the tipple. The sludge pond had been built and the dam for the fresh-water reservoir was under construction at that time.

The fresh-water reservoir was created by damming across the bed of a small creek flowing through the north side of the property. An earth dam and spillway were installed. The reservoir has a fresh-water capacity of some 78,000,000 gal. for use in the washing process. This phase of the planning is unique in that a complete circuit was worked out whereby fresh water will be handled by a pump located in its own pumphouse at the reservoir and feeding through 10-in. Transite designed for a pressure of 150 lb. The pump will furnish 1,000 g.p.m. of make-up water to the washing plant. The fines, slurry and refuse up to 1½ in., plus the overflow water, will be pumped from the washing plant to a sludge or settling pit. The overflow from this pit then is returned by open ditch to the fresh-water reservoir, making a complete circuit for the washing-water system. Additional details are given in the description of the preparation plant later in this article.

In July, 1948, another large guy derrick was in place at the erection site for the stripping dragline. This machine is a Bucyrus-Erie 1150-B walking unit weighing in excess of 1,300 tons, including many tons of ballast to permit handling a 180-ft. boom. It is equipped with a 25-yd. bucket. Both the big stripper and the Marion machine, which is to be converted to a 6-yd. coal loader, are electrically operated. At this writing the 25-yd. stripper was nearing completion and was scheduled to move off the erection site to the scene of the first operation around Nov. 1, 1948. The electric power demand for operation of the loader, stripping dragline, pump motors, conveyor motors, operating motors in the processing plant, etc., will total some 3,000 kva.

The accompanying aerial view of the mine includes in the left front foreground the drainage ditch

SILO behind raw-coal conveyor dissipates thermal-dryer gases.

FRESH-WATER RESERVOIR (dam shown here) holds 78,000,000 gal.

from the spillway along the Hungry Hollow road. The Marion loader, equipped as a dragline, is at work making this cut. Right of center is the sludge settling pit, with the trees along the reservoir ditch immediately in front. The dam and spillway appear in the lower center. Coal enters the plant over the incline in the center of the picture. To the left, and also in the center, is the erection site and the big stripper. The village of Hillery and the railroad yards can be seen at the upper left, with the lead-in track, spurs and washing plant in the center.

The washing and processing plant was designed in collaboration with McNally-Pittsburg, which supervised erection by our labor. The plant was fast approaching completion when this article was prepared. Thoroughness in planning was especially stressed, even to the extent of employing color dynamics in the decoration of the structure, planned and charted with the aid of Pittsburgh Plate Glass Co. engineers. There will be little resemblance between the new Harmattan plant and the drab and colorless mines of yesteryear. Harmattan will be an attractive addition to its surroundings and a pleasant and colorful place to work.

Examination of the coal-flow chart (next page) shows that actual processing starts at the raw-coal hopper. Four 38-ton Euclid bottom-dump trailer-type trucks will bring the coal from the 6-yd. Marion loader up the haulage road and through the underpass to the raw-coal hopper. From there a 60-in. belt will transport it at the rate of 600 t.p.h. to a rotary breaker, which includes a scalping section, where all large coal will be broken to minus 6 in. Any rock from this stage will be bypassed directly to a 30-ton refuse bin. This bin is designed to take all refuse and rock above $1\frac{1}{2}$ in., and one 15-ton Euclid end-dump refuse truck will remove this material to the refuse dump.

From the rotary breaker all 6x0 coal will be elevated to the top of the tipple, where it will start its gravity journey through the various stages of washing and preparation. Half the capacity, or 300 t.p.h., will be diverted into each of two five-cell boxes where it will be given its first washing. The pure coal will flow directly to the fresh-water sprays for additional cleaning, and across an 8-ft.-wide washed-coal classifier. The middlings from the first stage will pass through a middlings crusher to another five-cell re-wash box to remove additional impurities and salvage additional coal. All coal above $1\frac{1}{4}$ in. can be diverted directly to the truck bins by distributing conveyors or to the section of the plant handling direct railroad-car loading. All $1\frac{1}{4}$x$\frac{3}{4}$ pure coal is taken to the dewatering section and passed through the thermal dryers. The gases from these dryers are discharged into the silo exhaust stack previously mentioned.

In tracing the flow of various sizes, it will be noted that $1\frac{1}{4}$x0 refuse, even from the primary stages, is routed to a refuse sump, from which it is pumped to the disposal pond. The $\frac{3}{4}$x0, plus the water from the primary stages, goes to dewatering screens where the $\frac{3}{4}$x$\frac{1}{8}$ is removed and sent on to the surge bins and thermal dryers. After drying, this size returns through dried-coal elevators to the mixing conveyors and thence to the bins.

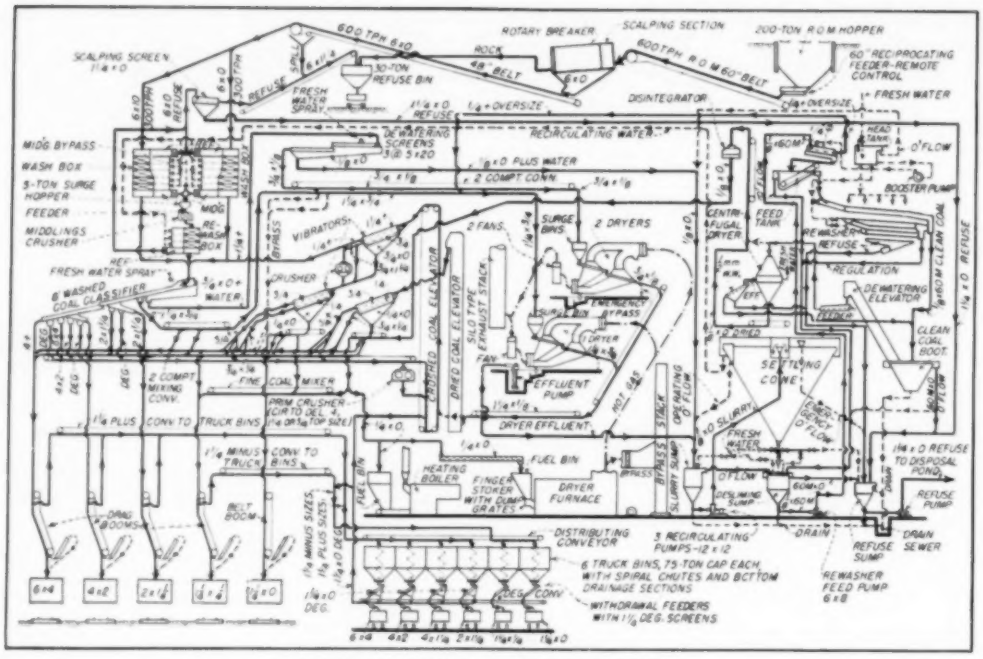
The $\frac{1}{8}$x0 from the dewatering screens, and also the thermal-dryer effluent, are directed to the slurry sump where three 12x12 recirculating pumps move them into the settling cone. The settlings then are drawn into the desliming sump. The $\frac{1}{8}$-in.x60-mesh is drawn off to the re-washer feed pump, which is 6x8. The minus 60-mesh flows to the refuse sump for pumping to the disposal pond. The $\frac{1}{8}$x60-mesh from the re-washer feed pump is directed to a McNally-Rheo unit, where it is re-washed. Separated from the refuse, the clean coal flows to the clean-coal boot, from which dewatering elevators deliver it to the feeder of the centrifugal dryer, thence to the disintegrator and back to the mixing conveyors for combination with the other sizes.

Plant Efficiency Major Goal

The goal in planning the layout of the processing plant was, as stated, maximum efficiency in the preparation of properly sized coal, eliminating all possible refuse and undesirable content and leaving a high-grade merchantable coal for shipment. Left of center in the flow chart is the primary crushing circuit, which permits reducing top-size coals to the smaller sizes when necessary to meet the requirements of stoker-fired plants.

It is immediately apparent that this plant is laid out to handle rail shipments and also adequately designed to handle truck loading from a separate set of bins to take care of local dealers and truck-delivery traffic. A loading boom is provided for placing coal into covered trucks. The standard sizes to be produced are 6x4, 4x2, 2x$1\frac{1}{4}$, $1\frac{1}{4}$x0 and stoker. Provision also has been made for oil-treating the smaller sizes to control dust.

The erection of the intricate



COAL-FLOW CHART—Harmattan preparation plant.

washing and processing plant, with its many types of equipment, conveyors, washing boxes, piping, chutes, etc., entailed a great deal of planning, not only in arriving at the original layout, but in construction methods. Many unusual devices must be employed to speed up construction and keep plant cost to a minimum.

Among the devices that speeded up not only the erection of the washing plant but also many other operations, such as erection of the stripping and loading equipment, were Coffing ratchet-lever hoists. At the time this was written 17 of these efficient tools were in use in the erection of the washing plant, making it possible to handle several sections of conveyors, spouting, launders and other heavy pieces of equipment without tying up the primary cranes. In lining up conveyors, heavy spouts, wash-box sections, etc., the men suspend these hoists from the steel framework, making it possible to position this equipment to the fraction of an inch, lining up bolt holes or pulling them into place both horizontally and vertically. Following erection, these same ratchet-lever hoists will be indispensable in the maintenance and operation of the entire plant.

Many man-hours can be saved in construction time, and days can be subtracted from the final completion date, by properly planning and equipping a project of this type with auxiliary hoisting equipment to relieve major units, such as draglines, stiff-leg derricks, etc. Many pieces of equipment can be handled simultaneously to completion, since these hoists are manufactured in capacities of from ¾ to 15 tons, lending themselves to diversified application as needed. This is but one of the things that must be thought out in advance in planning the overall construction of a strip operation. To recapitulate, the planners must think of many hundreds of items, processes and pieces of equipment to successfully attain their goal and to meet a production deadline commensurate with the investment involved.

Finally, we come to the planning involved in the future use of the site of this operation after the coal has been removed. This phase of the planning is one in which Ayrshire Collieries is very much interested. It is a phase where another corporation, known as Meadowlark Farms, Inc.—a wholly owned subsidiary of the parent company—takes over. The management and operating personnel of the Ayrshire organization are very conscious of the need for conservation of our resources and the necessity of planning for future production in areas which have been stripped of one of our most valuable items—coal.

We do not concede that stripping need despoil the property involved and eliminate it as a contributing factor to our future economy. It is our belief and practice that, with proper fencing and the planting of certain trees and grasses on the spoil banks and berms, this land can become valuable for grazing and the raising of badly needed timber. To that end Meadowlark Farms, Inc., will succeed the present operation in preparing this land for its rightful role in the future economy of our nation.

Truly, the planning of a venture of this type covers a great deal of territory and must be given a great deal of consideration, for to be successful it must be well financed and well planned on the basis that the consumer of coal must and will be best served, that the stockholders of the corporation will benefit thereby, and that the operation will be left in such a condition that it will serve a useful purpose in the future as well as in the present.

Table I—Combined Operating and Financial Summary—20 Bituminous Coal-Mining Companies

	1947	1946
Production, millions of tons	101.0	86.7
Total income, millions of dollars	698.9	480.1
Total costs, millions of dollars	619.7	445.4
Taxes on income, millions of dollars	27.0	10.8
Net income, millions of dollars	52.2	23.9
Dividends paid, millions of dollars	14.9	10.1
Net income retained, millions of dollars	37.3	13.8
Net income as percentage of total income	7.5	5.0
Dividends as percentage of total income	28.6	42.1
Net income as percentage of total capital	13.1	6.9
Net income as percentage of invested capital	16.0	8.3
Current assets, millions of dollars	216.8	168.6
Current liabilities, millions of dollars	89.2	56.5
Working capital, millions of dollars	127.6	112.1
Current ratio, assets to liabilities	2.43	2.99
Net investment in fixed assets, millions of dollars	240.7	209.5
Invested capital, millions of dollars	327.2	287.7
Borrowed capital, millions of dollars	71.1	55.5
Total capital, millions of dollars	398.3	343.2
Borrowed capital, as percent of total capital	17.9	16.2
Percent of total capital in working funds	32.2	32.7
Percent of total capital in fixed assets	60.5	61.0

Financing Bituminous Coal

While War and Postwar Earnings Have Improved Bituminous Coal's Financial Position, a Basic Weakness Still Exists—Consolidation of Operations and Wiser Use of Working Funds Are Logical Industry Steps

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THE ABUNDANCE of thick easily accessible coal measures of good quality has determined to a considerable degree the nature of the financial structure of the bituminous coal-mining industry. Easy development of these seams made possible the maintenance of productive capacity almost always near to or, more usually, in excess of the ability of the market to consume (with attendant effect on coal prices). Coal mining, as a result, became highly speculative and, as risks grew, capital was more difficult to procure. During the period which witnessed the rise of public corporations throughout most other industries, coal mining became more and more an industry of single enterprisers and small family companies. With limited investment, mine exploitation was restricted to the essentials of pit operation. Technological development came slowly. So deep was the rut, the growth of oil and gas competition failed to stimulate any material progress. The record of financial losses continued up to the advent of the war.

Wartime and postwar earnings have improved the financial position of the industry and, in recent years, a great deal has been accomplished in both the mining and preparation of coal. While it is to be hoped that this progress will continue, the balance sheet of the industry displays a basic weakness that is a distinct threat to the future well-being of the industry unless action is taken to strengthen its financial position. Some suggestions are offered in the following material.

In the petroleum industry, an excellent index to financial operations is provided by the publications of The Chase National Bank, giving financial and operating data for certain oil companies. The following presents somewhat similar information for certain bituminous coal-mining corporations. The intent of this brief study is to make available cumulative data which will, in a general way, set forth some of the economic characteristics of coal finance. Conclusions are of necessity inferential, since this is by no means an exhaustive treatment. Certain significant observations are possible nonetheless.

In setting up the various tables summarizing the material I have followed in general the outline of those originated by The Chase National Bank, because I can think of no better manner of presenting information of this sort and because those familiar with the petroleum studies will be interested in comparing data.

In this corporate age of giant public companies the coal industry remains something of an anachronism. At the time of the last census there were 5,009 companies engaged in operating 5,686 bituminous coal mines. While a substantial number of these companies are, of course, small unincorporated enterprises, the outstanding characteristic of the financial structure of the bituminous coal-mining industry is that it is made up of small, usually closely held companies. The largest of these produces less than 5 percent of the total national output of bituminous coal. There are only 11 consolidated corporations (counting both commercial and captive producers) whose annual tonnage is equal to 1 percent or more of the 1947 production. While conjectural, it still is difficult to escape the inference that this dispersal of its financial resources has had a greater economic bearing on the fortunes of the coal industry than any other factor. Somewhat more concentration is evident in the selling of coal, where a single sales company commonly is agent for a number of unrelated producers.

Data from the financial statements and other sources on 20

Table II—Net Investment—20 Bituminous Coal-Mining Companies

	1947 Millions	1947 Pct.	Change, Millions	1946 Millions	1946 Pct.
Borrowed capital	$71.1	17.9	$15.6	$55.5	16.2
Invested capital	327.2	82.1	39.5	287.7	83.8
Total	$398.3	100.0	$55.1	$343.2	100.0

Table III—Distribution of Net Assets—20 Bituminous Coal-Mining Companies—1947

	Millions	Percent
Investment in fixed assets (net after deducting depletion and depreciation reserve)	$240.9	60.5
Investment in working capital (current assets less current liabilities)	127.6	32.0
Other investment (miscellaneous assets)	29.8	7.5
Total net assets	$398.3	100.0

Table IV—Corporate Net Income After Tax Deductions—Bituminous Coal-Mining Industry

	Millions		Millions
1928 (loss)	$28	1938 (loss)	$32
1929 (loss)	16	1939 (loss)	13
1930 (loss)	45	1940	4
1931 (loss)	49	1941	19
1932 (loss)	52	1942	31
1933 (loss)	49	1943	45
1934 (loss)	11	1944	44
1935 (loss)	18	1945	36
1936 (loss)	16	1946	40
1937 (loss)	11	1947	125

Sources: 1928-43, National Coal Association reports based on Treasury data; 1941-45, statistics of income, Bureau of Internal Revenue; 1946-47, estimated.

Table V—Earnings and Ratio of Earnings to Total Income—20 Bituminous Coal-Mining Companies

	Millions	Net Income as a Percentage of Total Income				
	1947	1947	1946	1945	1944	1943
Gross income	$698.9	100.0	100.0	100.0	100.0	100.0
Net income before taxes	79.2	11.3	7.2	9.5	9.8	9.7
Net income after taxes	52.2	7.5	5.0	5.6	5.2	5.2

Table VI—Income Statistics—1945

	All Industrial Groups Millions	Pct.	All Mfg. Millions	Pct.	Bituminous Coal Mng. Millions	Pct.
Total compiled receipts	$255,318	100.0	$141,270	100.0	$1,544	100.0
Net income before taxes	21,139	8.3	10,250	7.3	71	4.6
Net income after taxes	10,346	4.1	4,140	2.9	36	2.3

Source: Bureau of Internal Revenue, Treasury Department.

Table VII—Rate of Return on Net Worth

	Percent 1947	1946
20 bituminous coal-mining companies (1)	16.0	8.3
103 mining and quarrying companies (2)	15.1	9.4
1,571 manufacturing companies (2)	17.1	12.1
1,254 manufacturing companies (3)	11.8	

Sources: (1) Financial statements of the corporations; (2) The National City Bank of New York; (3) Securities and Exchange Commission.

Table VIII—Dividends Paid in 1947—20 Bituminous Coal-Mining Companies

Dividends as a Percent of Net Income	Number Companies	Aggregate Working Capital, Millions	Average Working Capital, Millions
Over 70%	2	$10.2	$5.1
50-70%	5	22.5	4.5
30-50%	2	2.8	1.4
10-30%	9	82.9	9.2
Under 10%	2	9.2	4.6
Total	20	$127.6	$6.4

Table IX—Distribution of Gross Fixed Assets—20 Bituminous Coal-Mining Companies—1947

	Millions	Percent
Plant and equipment	$284.6	57.4
Lands and minerals	198.7	40.2
Miscellaneous capital assets	12.0	2.4
Total	$495.3	100.0

bituminous coal-producing companies make up the basic material of this survey. These 20 corporations in 1947 produced 100,987,871 tons of coal, equivalent to 18 percent of the total produced that year or, more pertinently, 20 percent of the commercial tonnage sold. The list is:

American Coal Co. of Allegany County.
Ayrshire Collieries Corp.
Chicago, Wilmington & Franklin Coal Co.
Franklin County Coal Corp.
Hatfield-Campbell Creek Coal Co.
Island Creek Coal Co.
North American Coal Corp.
Northern Illinois Coal Corp.
Old Ben Coal Co.
Peabody Coal Co.
Pennsylvania Coal & Coke Corp.
Pittston Co.
Pittsburgh Consolidation Coal Co.
Pond Creek Pocahontas Coal Co.
Rochester & Pittsburgh Coal Co.
St. Louis, Rocky Mountain & Pacific Co.
Truax-Traer Coal Co.
United Electric Coal Cos.
Westmoreland Coal Co.
West Virginia Coal & Coke Co.

In analyzing the material on the following pages, bear in mind that these 20 companies cannot be considered representative of the industry. They are, in fact, by virtue of their size, their efficiency and the aggressiveness of their managements among the leaders of the industry.

Investment

The total investment in anthracite and bituminous coal mining was estimated in 1939 to be between $2.5 and $3.0 billion, with $407 million of this amount in anthracite mining (p. 73, *Energy Resources and National Policy*, National Resources Committee, 1939). Captive pro-

ducers have an estimated $400 million invested in bituminous coal mining. Investment in commercial bituminous coal mines now is between $1.5 and $2.0 billion.

Investment in the 20 coal corporations covered herein totals $398,333,568. Table II shows the distribution of this total between invested capital (capital plus reserves) and borrowed capital (funded debt and other long-term borrowings), and changes from 1946 to 1947.

It is significant that despite the record earnings of these 20 companies in 1947 and the high percentage of net income retained, borrowings increased $15.6 million, so that at the end of 1947 borrowings aggregated 17.9 percent of the total net investment, compared to 16.2 percent at the end of the prior year.

Of the $398.3 million net assets of these corporations, 60.5 percent is invested in plant, equipment, lands and other capital assets, and 32.0 percent is in working capital. The remainder is made up of miscellaneous assets and prepaid charges. Table III shows the distribution of these assets.

The ratio of current assets to current liabilities of these 20 companies is 2.43. One corporation had a ratio as high as 5.7. Only three companies had current ratios over 4.0.

For the industry as a whole it is unlikely that working capital is as high a proportion of total net assets. The probable distribution is not more than 20 percent of net assets in working capital, 70 percent or slightly more in net fixed assets and approximately 10 percent in miscellaneous assets.

Earnings

In the past 20 years the coal-mining corporations of the United States lost money in 12 years and had earnings in eight. On the basis of information afforded from an analysis of the earnings of the 20 companies discussed here, together with other available data, it appears that 1947 corporate net profits for the coal industry were the highest since 1920. Table IV shows corporate net earnings after tax deductions for all years since 1928.

Net income after tax provisions of the 20 coal corporations was $52.2 million in 1947, $23.9 million in 1946 and $21.5 million in 1945. Table V summarizes earnings of the 20 companies in 1947 and compares the rate of return on total income (net sales plus revenues derived from all other sources) both before and after tax provisions.

From various sources (see, for example, *OPA Data Book 15* and the Department of Commerce *Supplement to Survey of Current Business*, July, 1947), it appears that for all commercial coal companies 1946 net income prior to tax deductions was 4.5 to 5.0 percent of total receipts. After tax provisions, 1946 net income was probably 2.5 to 3.0 percent of sales. Treasury Department figures are available for 1945. The information for that year, and for 1941, is as follows:

Net Income as a Percent of Revenues, Bituminous Coal-Mining Industry

	1945	1941
Net income before taxes	4.6%	3.5%
Net income after taxes	2.3%	2.1%

Table VI gives 1945 statistics on income for the coal industry and shows similar information for all industrial groups and all manufacturing industries.

It is difficult to draw any meaningful comparison between earnings of different industrial groups. A study of coal earnings and the profits of other industries over a long period does show, however, that the profits of the coal-mining industry in relation to the value of its product are lower than those realized in most manufacturing enterprises. The coal industry seldom has been able to command a high enough margin over costs to draw earnings on its sales commensurate with those enjoyed in manufacturing. Operating costs represent a higher percentage of coal revenues than do those of other productive industries. In 1941, the last prewar year, producing costs in coal mining were 96.5 percent of revenues. In that year producing costs of all manufacturing corporations were 88.8 percent of receipts.

The $52.2 million net earnings of the 20 coal corporations in 1947 is equal to a return of 13.1 percent on the total net investment of $398.3 million. The rate of return in 1946 was 6.9 percent; in 1945, 6.5 percent.

Total net investment as used herein differs from net worth in that it includes invested capital (net worth), plus borrowed capital (funded debt and other long-term obligations). The rate of return on net worth of these 20 companies was 16.0 percent in 1947, 8.3 percent in 1946 and 8.0 percent in 1945. The Securities and Exchange Commission listed (Release No. 128) the rate of return of 1,254 manufacturing corporations as 11.8 percent in 1946 and 9.6 percent in 1945. The SEC has not yet released the figures for 1947, but comparable information has been compiled by The National City Bank of New York (see *The Controller*, June, 1948, issue) and it is included in Table VII.

Dividends

In the decade 1930 to 1940, the coal industry lost $296 million and paid dividends of $134 million. From 1940 through 1946, the industry earned $219 million and made dividend payments of $160 million. The average annual dividend payment from 1930 to 1940 was $29.6 million; from 1940 through 1946, $26.7 million. A study of the recent and earlier financial record of the American coal industry seems to indicate that the dividend policy here has been no more enlightened than in Britain, where failure of coal operators to retain a volume of capital adequate to overcome the difficulty of mining under increasingly adverse natural conditions is sometimes cited as a principal factor in the decline of the British coal industry. Considered, however, in relation to investment, the over-all dividend rate has not been excessive. It has, in fact, been less than that paid by most other industries. During most of the recent years in the coal-mining industry profits simply have not been sufficient to permit payment of reasonable dividends on investment.

In 1947, dividends paid to common and preferred stockholders of the 20 coal companies here discussed were $14.9 million. This is 28.6 percent of the net income after taxes. Dividends paid in 1946 were $10.1 million, or 42.1 percent of net income after taxes. Table VIII presents some salient figures on the distribution of dividend payments among the 20 corporations.

Fixed Assets

At the ends of their various 1947 fiscal years, the 20 coal companies had invested in fixed assets a total of $240,702,289, which is the net amount after deducting reserves for depreciation and depletion. Examination of the capital-asset accounts of each of these corporations reveals that a sizable portion of their investment in fixed assets is

Table X—Relation of Gross and Net Fixed Assets —20 Bituminous Coal-Mining Companies

	194/		1946	
	Millions	Pct.	Millions	Pct.
Gross fixed assets	$495.3	100.0	$456.6	100.0
Reserve for depletion and depreciation	254.6	51.0	247.1	54.0
Net fixed assets	$240.7	49.0	$209.5	46.0

Table XII—Working Capital—20 Bituminous Coal-Mining Companies

		Millions	
	1947	Change	1946
Current assets	$216.8	$48.2	$168.6
Current liabilities	89.2	32.7	56.5
Working capital	$127.6	$15.5	$112.1
Current ratio	2.43	....	2.99

Table XI—Source and Disposition of Working Funds—20 Bituminous Coal-Mining Companies—1947

Source:	Millions	Percent
Net income after taxes	$52.2	61.2
Depreciation and depletion allowance	17.5	20.5
Total from operations	$69.7	81.7
Increase in borrowings	15.6	18.3
Total available	$85.3	100.0
Disposition:		
Capital acquisitions less sales and retirements	$46.5	54.5
Increase in working capital	15.5	18.2
Increase in miscellaneous assets	8.4	9.8
Total used in business	$70.4	82.5
Dividends paid	14.9	17.5
Total disposed	$85.3	100.0

in coal lands and minerals. Something like 40 to 45 percent is the norm. An important point to be noted is that the coal-mining industry is one where a large segment of the investment, particularly of the bigger companies, is tied up in reserve coal lands and minerals which contribute little or no current income. Open-cut producers, whose coal acreages usually include extensive surface holdings, have turned to farming, stock raising and forestry to put idle land to use, both prior to and subsequent to mining.

The distribution of gross fixed assets among the various accounts is given in Table IX.

The relation of gross to net capital assets for 1947 and 1946 is shown in Table X.

The change in net from 46.0 to 49.0 percent of gross fixed assets is some indication of the extent of the modernization programs carried through in 1947 by these several companies. Expenditures, less sales and retirements, for lands, plant and equipment were $46.5 million during 1947. In the same period depreciation and depletion allowances aggregated $17.5 million.

The gross asset value of the physical equipment engaged either directly (mine plant) or indirectly (office and office equipment) in mine operation for the 20 companies is $2.80 per ton of coal produced in 1947. The net carrying value is approximately $1.30 per ton of production. This figure does not include investment in such facilities as, for instance, river transport equipment.

We here approach one of the fundamental factors determining the inclination of the industry. Cost of the physical plant, including development, of a large, fully mechanized underground mine is currently of the order of $5 per ton of annual capacity. Coal can be mined with equipment whose total cost is under $1 per ton of yearly output. The large number of accessible seams and the uncertainty of coal profits tended over a long period to restrict development to operations of the second type.

Mechanization began and progressed almost exclusively for many years in those areas which labored under some artificial economic restraint, such as adverse wage differentials. Only within recent years have high wage rates given to mechanized mines a distinct cost advantage commensurate with the greater venture capital required in their development. The trend for a long while has been in that direction. Sufficient incentive now exists to accelerate that trend. The small volume of working capital and the low carrying value of fixed assets indicate the need of outside financing. Whether the industry can attract such capital is dependent on its ability to show some stability in earnings.

Working Capital

The internal sources of working capital for the coal industry are net earnings and non-expended income deductions for depreciation and depletion. Table XI shows the source and disposition of working funds of these 20 coal corporations in 1947.

The change in working capital from 1946 to 1947 is set forth in Table XII.

It is significant that despite an increase of $15.5 million in working capital the ratio of current assets to current liabilities dropped from 2.99 to 2.43, and that the cumulative working capital of 20 of the largest commercial coal-mining corporations aggregated only $127.6 million. The total can hardly be termed liquid as $27.2 million is tied up in inventories of operating supplies and store merchandise. The actual working capital of these companies, therefore, is only some $100 million.

Compare this $100 million working capital, spread among 20 companies which, in 1947, produced 20 percent of the nation's commercial bituminous coal, with the $690 million working capital shown on the Dec. 31, 1947, consolidated balance sheet of Standard Oil of N. J. which, with its affiliates, produced 9 percent of the domestic crude oil output in 1948. The working funds of Standard Oil of N. J. probably are nearly twice those of all commercial coal-mining companies in this country. In 1948 alone, the petroleum industry planned to spend $4 billion, which is more than the gross amount invested in coal mining, for new exploration, drilling, transportation and refining projects (see address of Dr. Gustav Egloff, chairman, petroleum division, American Chemical Society, at the society's annual convention at Chicago, 1948). The coal industry suffers the weakness of under-capitali-

zation common to any industry made up of small privately owned companies.

Consolidation

The immediate prospect of the coal industry securing the additional capital it requires from outside sources is not particularly good. The market for capital is competitive, and its long record of losses and labor strife mark the coal industry a poor competitor. One further factor that has always been against the industry as a borrower is this: mining equipment is not good collateral; it has little value except at the mine. If coal earnings are not sufficient to repay the loan, the equipment probably has worth only as scrap.

However, the financial weakness of the coal industry stems not only from the insufficiency of its total capital. There also is the additional evidence of weakness arising from the wide dispersal of its financial resources and, while there is slight immediate hope that help from external sources is forthcoming, there is considerable opportunity for utilization of internal funds in a more efficient manner. Over the long period the greater stability that will redound to the industry from a better disposition of the capital it has will provide the best inducement to new funds.

The single most attractive promise in this direction flows out of the advantages of consolidating some of the many producers into larger firms. The operating record of the 20 companies previously discussed, compared to that of the remainder of the industry, demonstrates the superiority of the large corporations. Even among the bigger companies the possibilities of merger are numerous and the advantages are as great. The outstanding example in recent years is, of course, the union of three large coal producing groups into the Pittsburgh Consolidation Coal Co. The result was an organization stronger than the cumulative total of the units from which it was formed and capable of undertaking programs of mine development and rehabilitation and coal research beyond the expectations of its predecessors. There are numerous others.

In a great many instances direct economic benefits can be derived in the mining, handling and selling of coal when several producers consolidate to form a single organization. The merger of the working funds of these groups does not necessarily insure more efficient utilization of capital, but it does make possible economies in operation and extends the range of potential activity beyond the limits of the unconsolidated units acting either independently or cooperatively.

Historically, the development of any industry into larger units has been accompanied by a more stable commodity price and the lessening of that type of competition which has so long been characteristic of the coal industry. The particular weakness of coal operators as bargaining agents in labor negotiations comes mainly from the lack of coherence in an industry made up of several thousand small producers. Consolidation of some of these companies into larger units might prove the effective means of providing industry leadership more nearly capable of bargaining with the monopoly union on an equal basis. In the light of all this, I earnestly suggest that each bituminous coal-mining company review its individual financial and competitive position to determine whether amalgamation with one, two or more other producers is not in order.

The opportunity for cooperative effort short of merger has hardly been touched. There is fortunately throughout the industry a great deal of exchange of information and comparison of experience. Coal companies also have joined together in various associations or have collectively supported the activities of district and national groups. Generally, however, the efforts of these organizations are directed toward some over-all or long-range program of wide scope. Active cooperative participation by several companies in those matters which are the day-to-day operating problems of mining has not been common.

Dividend Policy

Coal companies should not only strive to use their working funds wisely; they also should hold on to what they have. Taken as a whole, the dividend policy of the coal industry has not been a wise one. The industry has paid out more than it could safely do and maintain any material efficiency. The fact that dividend payments in recent years have been somewhat more in line with reasonable expectations is probably more the effect of the higher personal income tax rate than any change in attitude toward the payment of dividends.

What rate of dividends a particular company can afford to pay, or what portion of earnings it can retain without running afoul of Sec. 102, is dependent on the financial status of the individual company. For the industry as a group the payment of dividends has, in the past, been given priority over the need for capital. The coal industry is not rich enough to afford such a luxury.

Especially in these times of high prices and the possibility of higher yet to come, it is important that the dividend policy be determined on the basis of a realistic appraisal of earnings and the requirements of the corporation. The problem of replacing worn or obsolete fixed assets is today on the minds of many mine operators. Depreciation realized on assets purchased years ago cannot possibly cover the cost of an equivalent item at present prices.

To the extent that coal companies have not been making adequate provision out of current operations for the excess of the cost of replacement over original cost of the equipment, current income has been overstated. The cost of remaining in business has gone up just as much as has the cost of labor and supplies. While some operators may seek complacency in the thought that what went up will in time come down, prices are not subject to the physical laws—they seldom have come down quite so far as they previously went up.

In coal mining the enterprise system finds peculiar obstacles which in almost every other coal-producing country it has not been able to overcome. In this country it can hardly be considered to have been successful. Here is a singular opportunity to demonstrate the resourcefulness of the American method.

Coal is so important to the general welfare—even more so now that the zenith of oil and gas appears to have been attained—that the industry cannot again be permitted to sink to the low level it reached between the wars. Whether the coal industry will continue along with other American industries as partners in a competitive system, or whether it will follow the familiar path of successive loss, government regulation and, finally, nationalization common to most of the older coal-producing nations, depends largely on those who control the financial resources of the industry.

SAFETY ON THE JOB is the primary responsibility of the foremen, who attend regular meetings on accident reduction and improved production, and who shafe in the incentives provided.

Getting Results in Safety

Organization and Training, With Continuous Education and Incentives for Miners and Supervisors, Pay Off in Safety Achievements at Union Pacific—Strong Safety Department and Safety-Minded Top Officials Key Factors

By I. N. BAYLESS
President, The Union Pacific Coal Co., Omaha, Neb.

"HOW DO YOU DO IT—with mirrors?" This question was put to me by a business associate shortly after the announcement of the U. S. Bureau of Mines that mines and employees of The Union Pacific Coal Co. had won seven awards for safety for the year 1947. These awards included the famed "Sentinels of Safety" trophy awarded by *The Explosives Engineer* and given

PHYSICAL SAFEGUARDS reinforce education and training. At the left, Thomas Overy Sr. poses with one of the safety devices he has developed in 20 years of service. At the right is an example of timbering under heavy top.

FIRST-AID TRAINING is a must for all employees, including top officials. Here, a new group is taking the 15-hour course.

the company's Winton mines for working 587,342 man-hours without a lost-time injury in 1947, and six Joseph A. Holmes Safety Association certificates of honor, presented annually to mines and individuals with outstanding safety records.

My associate's somewhat facetious question was no surprise to me since I had been asked similar ones—both serious and half jocular—before in the 16 years The Union Pacific Coal Co. has entered the "Sentinels of Safety" competition. A program was inaugurated in 1924 by Eugene McAuliffe and George B. Pryde, then president and vice president, and supplemented by those of us who are now responsible for the safe operation of the properties. The mines were entered in the national safety contest for bituminous mines in 1932 and the company has won the trophy nine times in the bituminous group.

While many could be named, credit for the achievements of 1947, and for the additional progress being made since that time, goes both to the employees of the company and to its supervisory, operating and safety officials, including H. C. Livingston, vice president; V. O. Murray, general manager; J. B. Hughes, general superintendent; I. M. Charles, chief engineer; F. J. Peternell, safety engineer; H. M. Tibbs, director of personnel; G. L. Stevenson, chief electrician; D. T. Faddis, master mechanic; and the following superintendents: Thomas Overy Sr., Rock Springs; Charles Grosso, Reliance; Hodge Burress, Stansbury; William Wilkes, Winton; G. L. Addy, Superior; and M. A. Sharp, Hanna.

OFFICIAL PARTICIPATION is a key factor in U.P. safety work. Here, the author addresses a semi-annual safety rally and prize drawing.

In the 19 years since I have been associated with The Union Pacific Coal Co., owned by the Union Pacific R.R., my answer to the question quoted at the opening of this article has varied but little from the following:

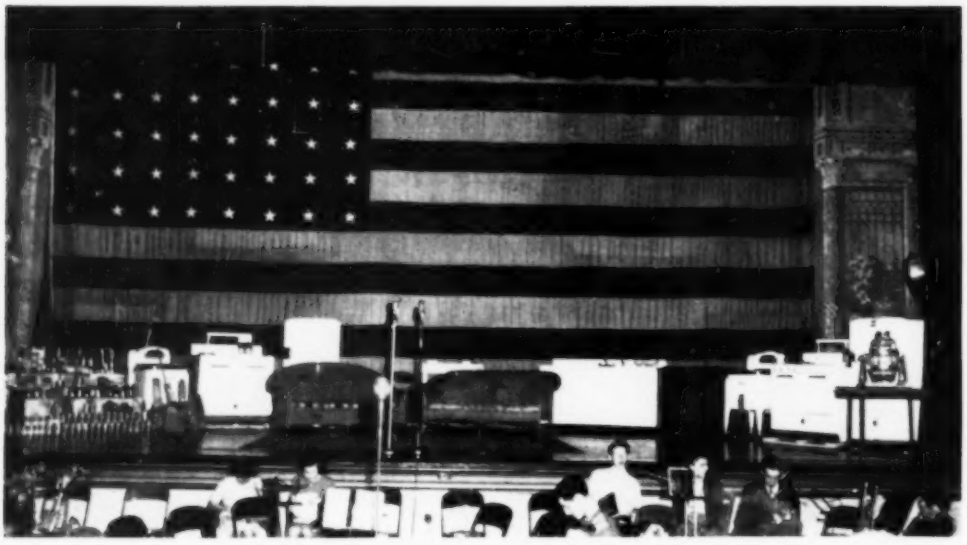
"We don't use mirrors, magic or lucky pennies. It's all a matter of organization and training, mixed with perseverance and hard work."

Although the order is not necessarily that shown, The Union Pacific Coal Co.'s safety program rests primarily on the following foundations:

1. Officials sincerely interested in achieving safety.
2. Placing major responsibility for safety on officials in direct contact with employees—unit foremen, and so on.
3. A strong safety department headed by a qualified safety engineer to assist foremen and others in safety work.
4. Proper induction and indoctrination of new employees.
5. Continuous education of officials and men.
6. Complete first-aid and other training.
7. Variety in safety work to maintain interest.
8. Incentives for both men and supervisors.
9. A safety honor society open to all foremen achieving the required safety records.
10. A code of standards for safe operation.
11. A safety manual for all employees.
12. Committees on safe practice.
13. Use of all approved safety equipment and materials.
14. Continuous working-hour inspection of mines and outside facilities.
15. Weekly meetings of supervisors to discuss safety and production.
16. Money.
17. Hard work.

As I pointed out in part in my remarks during the ceremonies attending the presentation of the "Sentinels of Safety" trophy to the

Substantial Prizes Boost Employee Interest at U.P. Safety Rallies



MONTHLY AND SEMI-ANNUAL RALLIES AND PRIZE DRAWINGS heighten interest and provide an incentive for employees. This illustration shows a part of the prizes at one semi-annal affair.

A NEW CAR—grand prize at a semi-annual drawing (right)—goes to a Union Pacific employee for safety at his work.

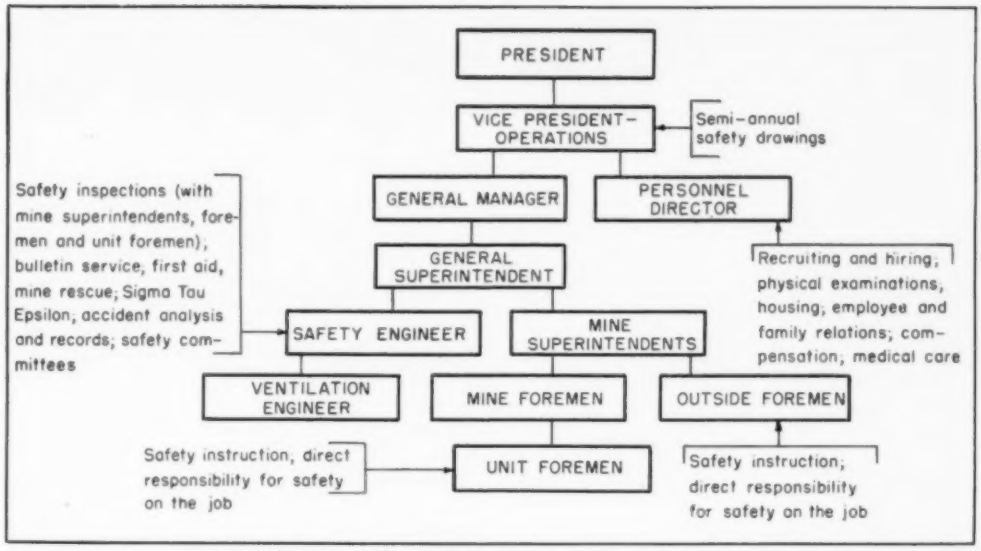
employees of Winton mine for their 1947 achievements:

"The management of The Union Pacific Coal Co. has an obligation to be sure that the conditions under which men work are as safe as practical engineering can devise. In addition to the humanitarian angle, there is the important consideration of the economic value of safety. It is an economic waste when the services of men trained to perform certain work are lost because of death or serious injury. Serious injury to an employee is not only a loss to the company; it also is a serious drain on the economy of the nation. We cannot appraise the value of safe working conditions in dollars and cents. However, we should look upon safety as making it possible to get the most out of life."

How safety is organized at Union Pacific and some of its outstanding operations are shown in the accompanying chart. It will immediately be noted that top officials have a major part to play. Perhaps second, a strong safety department is an essential part of the organizational set-up. Third, operating officials have an active responsibility.

Safety work begins with hiring and—it can be truly said—never ends. A full-time personnel director reporting to the vice president in charge of operations handles recruiting and hiring, including physical examinations for all new employees. The personnel director also handles housing and any problems that crop up in employee and family relations, in addition to his other duties in the line of compensation and medical care of injured persons.

Before actually going to work, each new employee meets with the mine superintendent, who gives him the company book of rules and discusses at some length certain company policies, such as those dealing with hard hats, shoes and goggles. After that, the unit foreman or



HOW UNION PACIFIC ORGANIZES FOR SAFETY. Top management plays a major role.

other supervisor takes over, except for such things as first-aid training. Courses in first-aid are conducted every six months and involve 15 hours of instruction by, as a rule, men from the first-aid teams. The courses, incidentally, are conducted under the supervision of the U. S. Bureau of Mines, which furnished the original instruction to members of first-aid teams.

First-aid training includes everybody—not only miners but all other workers, supervisors and officials up to and including myself. Upon successful completion of the 15-hour course — without pay — employees receive certificates from both the Bureau of Mines and the company. If an employee is unable to pass an examination after 15 hours of instruction, he is given special additional training until he is qualified for a certificate.

For maximum personal protection, miners are required to obtain and use goggles in addition to hard hats and safety shoes. Promotion of goggle use is an example of the unusual steps taken to effectuate a particular safety measure. When goggles were first introduced, each miner's eyes were examined and he was given—also free—goggles corrected to his vision. Free eye examinations still are given new employees—as well as older ones who request it—but the men must now provide their own goggles.

Other tried-and-true methods of promoting safety consciousness among employees include such things as bulletin boards at each mine showing the number of days the operation has been without an accident, and the publication of a monthly safety bulletin listing safety records by districts and reporting accidents and injuries. This monthly publication is designed for home reading and includes material, besides safety, of interest to other members of the family as well as to the worker himself.

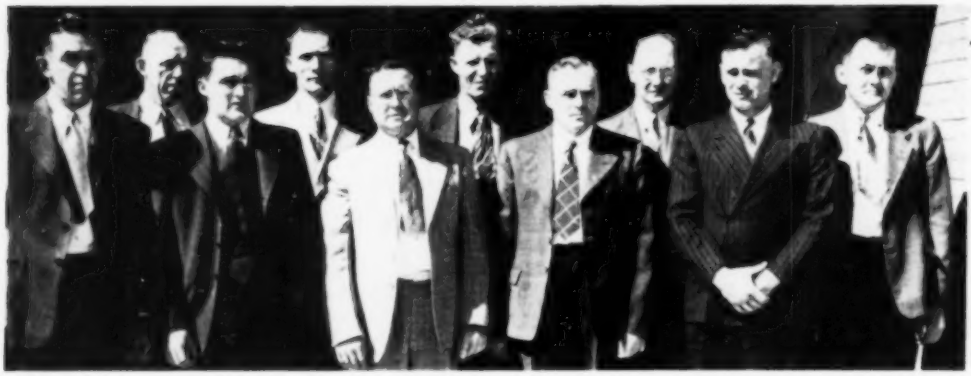
On the job, the book of rules and the company book of standards provide perhaps the major hard-and-fast principles to be followed by both workers and supervisors. Other than that, the job is largely left to the supervisors and men to work out as they proceed, always remembering that "Safety is the first consideration." This policy is followed as a result of experience which indicates that keeping the program informal and letting men and supervisors use their ingenuity and initiative, plus keeping interest up by varying the program, are more conducive to results than rigid formalism all the way through. The code of standards, incidentally, took nearly two years to prepare and has been revised seven times since its original publication date—July 15, 1925. Based on experience and engineering study, it provides the best possible guide to safe and efficient installation of wire, tracks, machinery and equipment, the construction of clearances and the conduct of other mining operations.

To facilitate joint worker-supervisor effort in the field of safety, each unit foreman is considered a supervisor of safety and functions as such. The average number of men assigned to a unit foreman is eight; the maximum, 16. Worked out by the general safety engineer, his assistant and the ventilation engineer, this arrangement has proved its worth in achieving maximum safety results.

The most attractive features of the safety program from the employee point of view are the monthly and semi-annual prize-drawings. These provide variety and incentive—both of which have been found most important factors in stimulating interest in safety. They also afford the management an opportunity to discuss safety problems with the miners under conditions most conducive to good reception, relaxation and good humor.

For administrative purposes, Union Pacific operations are grouped into six mining districts. A prize drawing is held in each district each month. If the district has experienced a lost-time accident, door prizes only are given. However, if the district has not had a lost-time injury, the door prizes, consisting of $50 in merchandise and varied each month, are supplemented by safety awards. For the first month without a lost-time injury, the men

Honors for Supervisors and Community Safety Feature U.P. Program



SIGMA TAU EPSILON INITIATES for 1946 honored for three years of supervision without a lost-time injury to their men were: Alex Clark (left), W. H. Buchanan, Ben Dona, James Herd, Thomas Lucas, J. J. Balog, Arthur Munn, Clyde Rock, R. Batista and Frank Subic.

SAFETY AT HOME AND IN THE STREET is included in the U.P. program. These photos were a part of a recent campaign.

draw for prizes of $15, $10 and $5. If the district goes two months, the prize is a suit of clothes, which also is offered every month thereafter until a lost-time accident occurs.

The door prizes promote attendance whether or not a main prize is being drawn for. As a result, attendance in 1948 was approximately 60 percent for the second shift and 75 to 80 percent for the first shift. The meetings usually last about an hour and, in addition to the drawings, include a sound picture running about 20 minutes and talks by the general safety engineer and at least one other official on safety, supplemented by addresses by outside men, such as highway patrolmen.

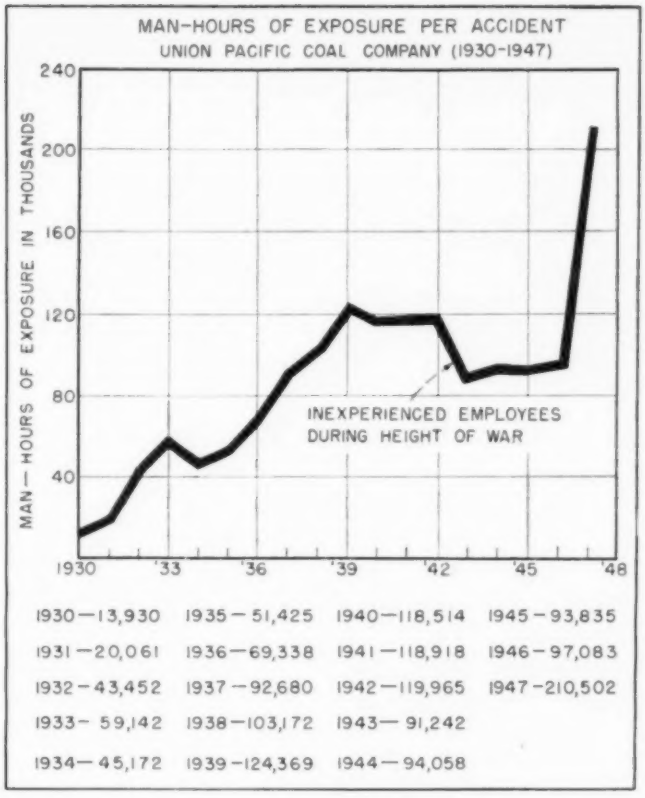
The semi-annual prize drawings with a number of prizes have replaced earlier annual drawings for one big prize. This change from yearly to twice-yearly drawings, and from one to a number of prizes, was made to introduce variety and promote interest by broadening the possibility of winning.

One of the two drawings is presently held in February and the second in August. All employees without a lost-time injury are eligible to compete, and the main program is held in the Old Timers' Hall in Rock Springs. The event is broadcast not only to the public but to meeting halls in all six districts if bad weather or the mine-operating schedule make attendance at Rock Springs difficult. Instead of an automobile, a trip to Alaska or some similar grand prize, awards now consist of merchandise, such as refrigerators, deep freezers, radios, furniture, groceries, and so on. Each district is allotted a prize to draw for, which keeps people at the meetings.

As with the monthly district meetings, the semi-annual affairs are more than merely prize drawings. In addition to safety messages by Union Pacific officials, an outside speaker is provided. It may be a state official, a representative of the Bureau of Mines or some other outstanding man, and he also carries the safety theme forward.

From day to day, however, as previously noted, supervision over safety is largely the job of the unit or other foremen. To help them, provision also is made for both variety and incentive. Unit foremen whose crews have not suffered a lost-time injury over the month are eligible to draw for separate money prizes at the monthly district safety rallies and prize drawings.

Since he is, in fact, the supervisor of safety on the job, the unit foreman is charged with the particular responsibility of welcoming new men, introducing them to their work and training them so that safety becomes automatic and they are able to function most efficiently. Also, of course, new safety rules and new production methods are imparted to all men, whether new or old, by the supervisor.



THE PAY-OFF AT UNION PACIFIC—a steady accelerating rise in man-hours per accident.

Supervisors are kept abreast of safety developments and management policy at weekly meetings, which invariably are attended by one or more general officials. The meetings normally last an hour, and the proceedings include discussion of accidents, if any have occurred, consideration of safety inspection reports and discussion of production problems. The supervisors also are encouraged to subscribe to and read the pertinent technical and safety publications and to study meeting papers and transactions dealing with both safety and efficient operation.

A key factor in the Union Pacific safety program is continuous working-hour inspection of all mining operations and surface facilities. In other words, one representative of the general safety engineer inspects continuously on the day shift and a second on the night shift. The inspectors are accompanied by the mine foremen or other supervisor and, from section to section, by the respective unit foremen. Any violation of the code of standards is reported to the general manager who, in turn, passes it to the superintendent of the operation for corrective action. The safety department then checks to make sure that the corrective action was taken. Standard report forms are *not* used in safety inspection because, among other things, it was felt that they would be conducive to getting into a rut, whereas freshness and a flexible approach are the real essentials.

An out-of-the-ordinary additional step has done much to reinforce safety work at Union Pacific operations. That step was the founding in 1941, with 43 charter members, of Sigma Tau Epsilon, the first Greek-letter safety honor society in the world. Membership is restricted to supervisors "who have attained a commendable standard of safety in the conduct of their work." Those eligible for membership and the qualifications are:

Mine superintendents at mines that have won the Sentinels of Safety Trophy.

Mine foremen in charge of an operation that has won a Sentinels of Safety Trophy, or which has completed a calendar year without a lost-time accident.

Unit foremen and outside foremen who have conducted operations for three consecutive years without a lost-time injury to men in their charge. Only unit foremen and outside foremen are eligible to vote and hold office. General officers are not eligible for membership, but any society member promoted to a general office position may retain his membership.

The society meets quarterly. Its major contribution, however, is through the operation of committees on safe practices. Ten such committees function continuously in the following fields:

Roof and rib falls and timbering.

Haulage.

Handling and use of explosives.

Handling and storage of material inside.

Ventilation and rock-dusting.

Electrical and mechanical installations.

Proper operation and maintenance of tools and machinery.

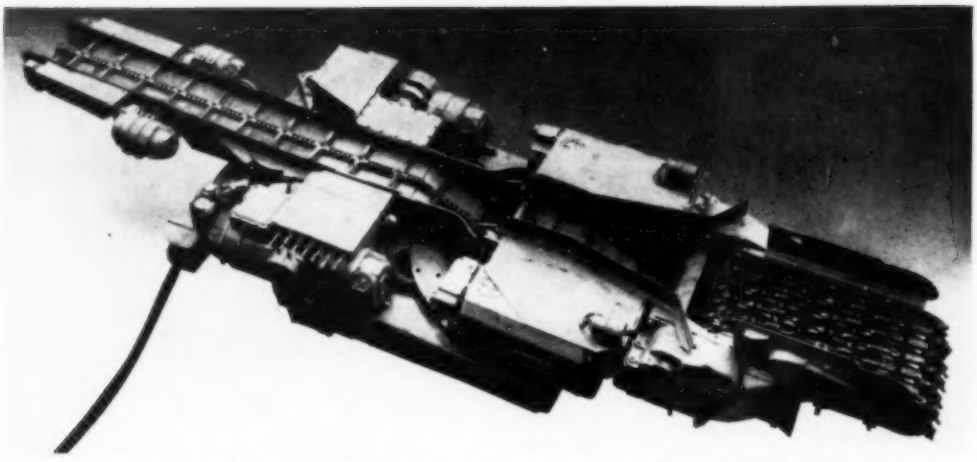
Handling and storage of materials outside.

Prevention of injuries from slipping and falling of persons.

General welfare, inside and outside.

Each committee keeps a continuous eye on its phase of the safety problem. All accidents are reviewed and discussed and, when all the evidence is in, the committees make the necessary recommendations for hazard elimination and safe operation. If accepted by the final authorities—the president and vice president in charge of operations—the recommendations go into effect.

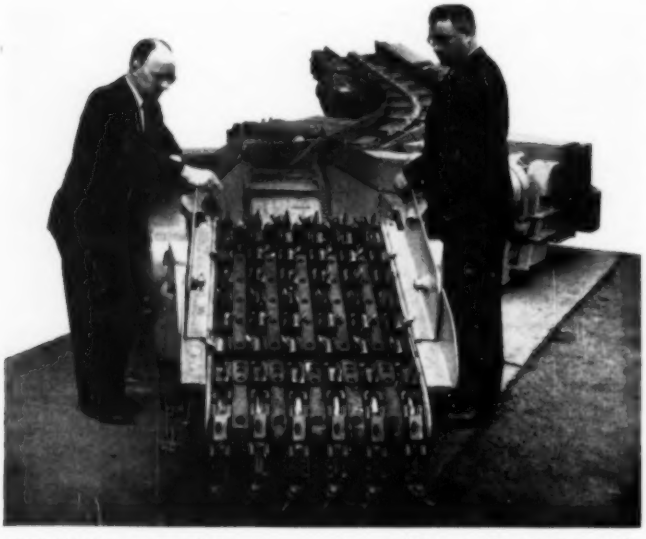
Actually, what has been presented previously barely touches on the highlights of our safety program. It is notable that the company has dug deeply into its pocket for safety materials and the employment of safety engineers. Except for the war period, when the necessity for hiring large numbers of green men was a complicating factor, and for years in which major strikes or strike threats occurred, which our records show are reflected in an immediate increase in accidents during the period of disturbance, the result has been a steady and accelerating rise in man-hours of exposure per accident, as shown in the accompanying chart.



SWINGING FRONT END OF THE CONTINUOUS MINER carries the ripping bar and intermediate conveyor flanked by the main motors. The main chassis includes the hopper, rear conveyor and auxiliary power and control equipment.

The Continuous Miner

New Continuous Machine Offered in Both Low and High Models—Design Capacity 2 Tons per Minute—Swinging Head and Tail Provide Maximum Flexibility in Turning or Pillaring—Coal Dug Out of the Solid by Ripping Bar



RIPPING BAR and intermediate conveyor can be swung 45 deg. in either direction. At the right is Harold F. Silver, the inventor, with John R. Sibley, Joy product engineer.

FEATURING a ripping head for mining coal out of the solid, the new 3JCM-2 Joy continuous miner was given its first public demonstration at the Joy plant, Franklin, Pa., and at the Mathies mine of the Pittsburgh Coal Co., south of Pittsburgh, Pa., Dec. 14-15. With a design capacity of 2 tons per minute, the continuous miner presently is being produced in two models. The low model is offered for use in seams 40 to 60 in. thick, and the high model in seams 54 to 96 in. thick.

The machine, it is stated, can mine places 10 to 17 ft. wide and can turn a corner either to the right or left or mine at any desired angle. Therefore, the company points out, it can be adapted to all conventional mining systems, including crosscutting, necking and pillar recovery. Over-all height of the low-type unit is 34 in.; high-type, 48 in. Length is 25 ft. 6 in.; width, 7 ft. 6 in.

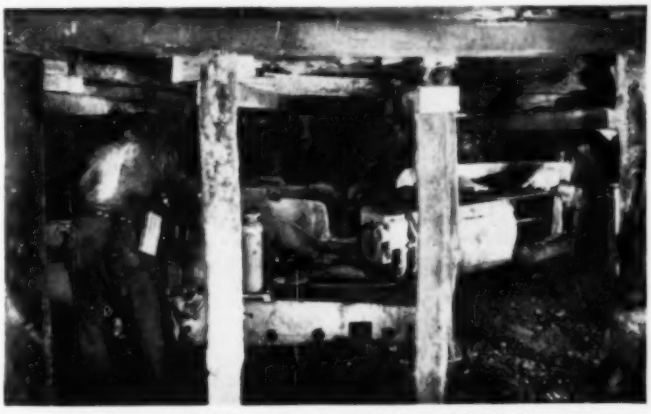
The continuous miner consists essentially of a swinging front end comprising the ripping head, intermediate conveyor and necessary power units, plus the main chassis mounted on crawlers and including a hopper and swinging rear conveyor. Both the front end and the rear conveyor can be swung 45 deg. each way, or a total swing of 90 deg. This, it is stated, results in a

CONTINUOUS MINER operating in low coal in the lower Freeport seam, pulled back to show the ripping bar, which can be retracted or advanced 18 in. No timbering is required at this particular operation except when fault areas are encountered.

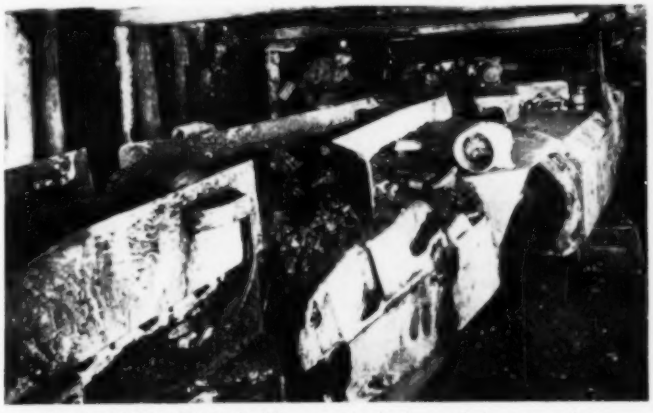
high degree of operating flexibility and permits easy driving of crosscuts, turns, room necks and other necessary openings.

The ripping bar and intermediate conveyor can be advanced or retracted a distance of 18 in. In mining, therefore, the ripping head and conveyor are retracted and the machine is run forward on the crawlers until the bar touches the coal. The head is swung to the right to the rib line and the ripping bar is dropped to the floor and sumped 18 in. into the coal. Hydraulic jacks then go into operation to force the ripping bar upward to the top of the seam. Then the bar is retracted and the head swung to the left the necessary distance for the next stroke. These strokes are repeated until the desired width, up to 17 ft., is mined, whereupon the machine is advanced 18 in. on the crawlers for the next cycle.

Width of the ripping bar is 30 in. It is equipped with six chains each containing 20 tungsten-carbide-insert replaceable bits. Each chain is driven from a separate sprocket on a main driving shaft attached at each end to gear reducers that advance with the ripping head. Each gear reducer is connected to a 65-hp. (continuous rating) silicone-insulated water-cooled motor. Therefore, 130 hp. is available continuously to operate the ripping bar. This power is transmitted from the motor armatures through multiple-disc clutches to telescoping spline shafts, which permit the reducers and ripping

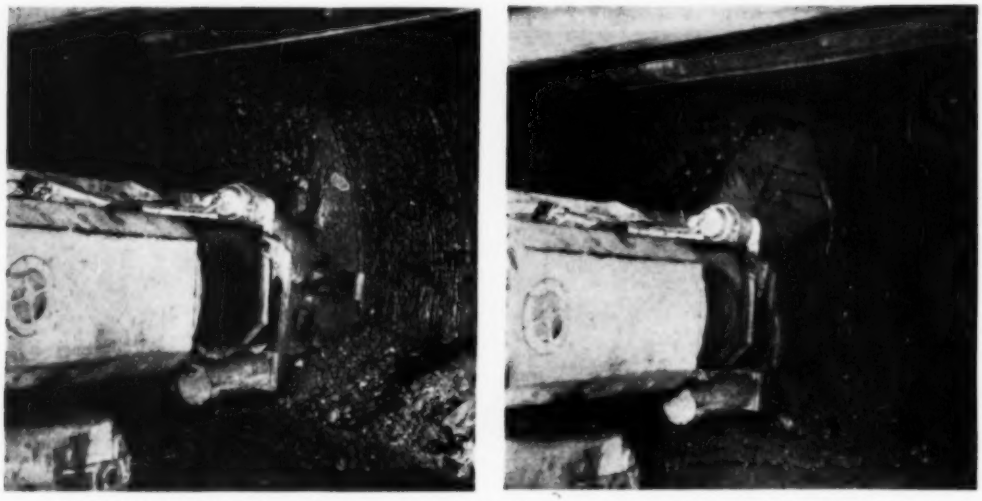


HIGH-COAL WORK under timbers, showing jacks on each side of machine.



IN THE PITTSBURGH SEAM—Coal flowing to the shuttle car which serves as a hopper.

Continuous-Miner Design Features Ripping-Head Principle



PRODUCTION STARTS with the ripping bar sumped in at the bottom and ends with it at the top (right) ready to pull back.

bar to advance 18 in. with respect to the drive motors.

Two hydraulic jacks are used to elevate the ripper bar, two more are installed to advance the bar and intermediate conveyor, and a third pair is employed for swinging the entire front head.

The intermediate conveyor, as noted, swings and advances with the ripping bar. The coal is pulled back by the chains and is discharged from the top of the ripping bar directly into the intermediate conveyor, which carries it back to a hopper. The intermediate conveyor is driven at its discharge end by one of the main motors.

The rear conveyor features single-strand universal-chain construction with cantilever flights to pick up the coal from the hopper and deliver it to the transportation medium. Power for swinging the conveyor 45 deg. each way is provided by two hydraulic jacks. A single jack underneath the conveyor provides vertical adjustment. The rear conveyor is driven by two 5-hp. motors at the discharge end.

Each crawler is driven independently by a separate 7½-hp. motor, providing a tramming speed of 35 f.p.m. and resulting, it is stated, in very-exact position control. A separate 7½-hp. motor and 15-g.p.m. pump power the hydraulic system. A main relief valve limits the maximum pressure to 1,500 lb. and separate relief valves are provided on the advancing, lifting and timber-setting cylinders. Filters in the hydraulic system remove foreign material from the fluid and assure long life for the working parts.

All main power circuits are controlled by magnetic contactors. The control circuits are actuated by sealed mercury timing tubes operated by the magnetic flux of the main contactors. This, the company states, provides a simplified control system not subject to the difficulties usually arising from dust and dirt. All electrical parts are sealed in explosion-proof compartments and flame-resistant insulation is used on all wiring. Motors are ventilated to improve maintenance.

Dust is controlled by spray nozzles strategically located on the ripping head. A high-pressure spraying system is now being tested and is expected to provide greatly increased dust control with a substantial reduction in water consumption. Included in the water system are a self-cleaning filter and an automatic shut-off valve to stop the spray when the ripping bar is retracted.

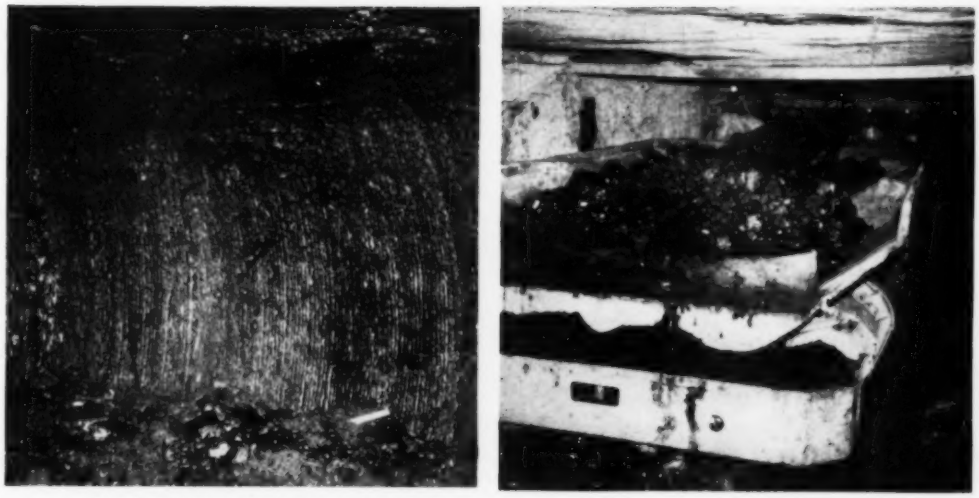
A double-acting roof jack is mounted on each side of the machine immediately ahead of the operator's station, which is 14 ft. back from the face. These jacks may be used directly to support the roof or for holding a crossbar while legs are being set. The operator, therefore, is protected at all times, while the machine itself will withstand a heavy roof fall, according to the builders.

The Joy continuous miner was invented by Harold F. Silver, of the Silver Engineering Co., Denver, at the suggestion of the late Carson W. Smith, then head of the Consolidated Coal & Coke Co. Joy earlier had been working on another type of unit but abandoned its original line of development when the ripping-bar principle became known.

A feature of the ripping-bar method of attack is the fact that after the initial sumping movement the coal is broken rather than cut out of the solid by a series of pick-like blows administered by the traveling bits. In other words, the bits are forced into the coal in an upward direction at a higher rate of speed than the speed of the bits around the bar. "Hence, the coal breaks and fractures ahead of the bits and is passed by the ripper bar back to the conveyor section of the continuous miner. The effect is analogous to that of the old-fashioned pick, but applied upwards instead of downwards and with multiple force." Consequently, it is pointed out, there is a substantial production of large-sized coal.

Based on experience with pilot models and production units, Joy officials are of the opinion that the continuous miner can be used in most of the coal seams now being worked mechanically. Operating case histories offered include the following:

1. Illinois—No. 6 seam 6 ft. thick; room and pillar with headings 11 ft. wide and rooms 12 to 14 ft. wide, 12- to 14-ft. pillars left in place. The continuous miner is used both for driving headings and working rooms. An extraction of



MINER RESULTS, Pittsburgh seam, in the form of a completed face (left) and in coal ready to go outside (right).

approximately 50 to 60 percent is being achieved.

One 6-ton shuttle car stays behind the miner to act as a surge bin, while a second car shuttles back and forth to deliver the coal to a belt. One man operates the miner, one the hopper car and a third the shuttle car. Hard structure and large sulphur balls are features of the coal and are being handled successfully by the miner.

2. West Virginia—50-in. seam; entry development with six parallel headings 16 ft. wide on 80-ft. centers, including crosscutting. One 4-ton cable-reel shuttle car serves as a hopper and stays with the machine. A second car delivers the coal to mine cars. One man operates the miner, one drives the shuttle car, a third handles the hopper car and assists in timbering, a fourth works full time on timbering and a fifth shifts mine cars.

3. Pennsylvania — Pittsburgh seam 7 ft. thick; room and pillar retreating; headings 12 ft. wide; rooms at right angles 13 ft. wide with 12-ft. pillars. The pillars are extracted by slicing them back on an angle of approximately 75 deg., leaving small triangular stumps. An extraction of better than 90 percent is claimed. Rooms are timbered with crossbars on 30-in. centers.

One $3\frac{1}{2}$-ton shuttle car serves as a hopper and a second as the haulage unit. Mine cars are shifted by a remotely controlled locomotive. The crew comprises four men for all operations, including timbering.

Trouble with the Pittsburgh drawslate is materially reduced, it is stated, because of speedier completion of working places and elimination of shooting. Thin hard impurity bands are ripped out without difficulty, according to the manufacturer, along with heavy, hard clay veins and bony formations. Such material can be ripped out and loaded into separate cars without difficulty.

4. Pennsylvania — Lower Freeport seam 46 in. thick; room and pillar with rooms 16 ft. wide and 14-ft. pillars left in place; crosscuts every 40 ft.; no timbering required except where fault areas are encountered. The extremely hard bone in fault sections is readily mined, it is stated. One $3\frac{1}{2}$-ton shuttle car serves as hopper behind the machine and a second unit delivers the coal to a belt. Five men comprise the crew, including a man to shift cars at the end of the belt.

5. Colorado—Laramie lignite 7 ft. thick; headings 11 ft. wide; rooms 14 ft. wide; pillars 26 ft. thick; occasional 10-percent grades are encountered. Where pillars are recovered, extraction runs 86 percent. The miner, it is stated, has virtually eliminated the need for timbering and as much as 115 ft. of heading has been driven in one shift. Haulage is by means of rubber-tired portable belt conveyors in series discharging to mine cars. The coal is woody in structure, rather hard to cut and subject to coring. "The continuous miner readily rips this coal from the face," it is said.

In addition to a lower operating cost and adaptability to prevailing mining systems and coals now being mined mechanically, other advantages of the continuous miner are summarized by the builders as follows:

1. Greater safety and better mining conditions as a result of the elimination of the shock of shooting; a major reduction in the number of working places for a given tonnage; and faster extraction, cutting down the time the roof is exposed to moisture, oxidation, settlement and so on. Supervision is improved and the problems of ventilation and water handling are eased, along with development and other problems.

2. Reduced timbering requirements and expense.

3. Ability to handle hard bands, partings, clay veins and bony material, and adaptability to the selective disposal of such materials when encountered.

4. Good coarse-coal production. In Illinois, using an earlier machine with a tunnel through which the coal had to pass and in which it was subjected to crushing action limiting the top size to approximately 6 in., a three-day test showed a production of plus $\frac{3}{8}$-in. ranging from 60 to 66 percent, compared to 68 percent with conventional loading. Between $\frac{3}{8}$ in. and 100 mesh, coal from the continuous miner was substantially coarser in nature.

TRESTLE AND TIPPLE, both with wooden framing and floors, now have automatic-sprinkler fire protection even in freezing weather. The top of the new washing plant, a steel and concrete structure, shows back of the tipple.

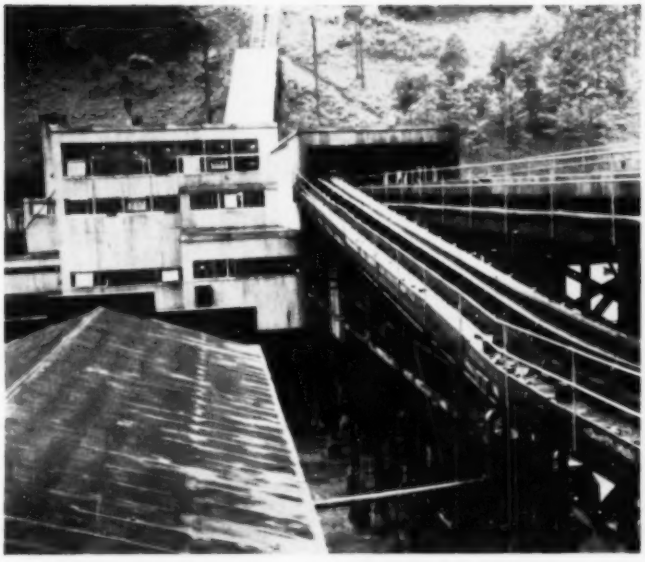
Automatic Fire Protection

Greater Protection, Lower Insurance Rates and Increased Coverage Feature Automatic Sprinkler Installation in Tipple and Other Wooden Structures at McGregor Mines — Dry-Pipe System Eliminates Freezing Hazards

COMPLETION early last year of an automatic system for fire protection in the tipple at McGregor Mines, of the Logan County Coal Corp., Slagle, W. Va., marked the first time, according to the contractor, that an automatic sprinkling system has been installed to protect

NEW 75,000-GAL. TANK (right) was added for the sprinkler system and can be connected with the 25,000-gal. town-water tank (left) and the two 75,000-gal. make-up-water tanks in the center.

THIS SMALL LEAN-TO attached to the mine supply house contains valves and control equipment for sprinkler heads in the trestle, supply house and a mine shop located about 50 ft. away.



McGREGOR MINES WASHING PLANT AND TIPPLE (right, at end of trestle). The overhead pipe (foreground) from the mine supply house is a part of the dry-pipe sprinkler system.

a wooden tipple at a bituminous coal mine. Now, the coal company gets a lower fire insurance rate and is in a better position to buy increased use and occupancy insurance—an important consideration during periods of high demand for coal.

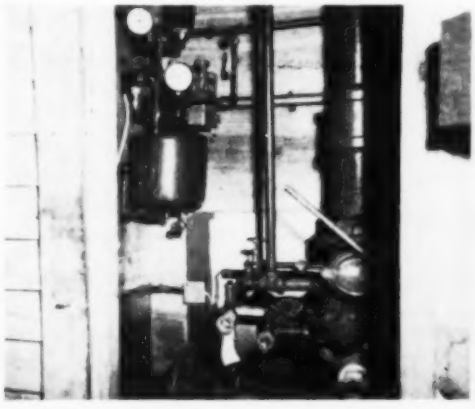
Automatic sprinklers have been used successfully in buildings in other industries for over 75 years. Insurance companies that have been writing protection on tipples have consistently asked for the ordinary precautions such as fire extinguishers, but in the past apparently have not urged the installation of automatic sprinklers. A few years ago, in the case of one large tipple and cleaning plant, it was reported that insurance companies turned thumbs down on a proposed automatic sprinkler system, claiming that vibration would be too likely to break the piping.

At McGregor Mines, the freezing difficulty was avoided by installing the dry-pipe system, which was devised close to 50 years ago and has proved efficient for low-temperature jobs. Improvements over the years have made the system quicker to act.

The protection at Slagle covers the tipple, a haulage trestle connected thereto, a mine shop and a mine supply house, all closely grouped. Although the McGregor plant is one of the new and outstanding washing plants of Logan County, the tipple portion was constructed with wood framing and wood floors. The original tipple and trestle burned in 1940 and the present wooden structures were rushed to completion in their place. The washer section of the plant, entirely of steel and concrete, was added in 1945 without interfering with production over the wooden tipple, which still functions for dumping mine cars, primary screening and the loading of the lump and washed sizes into railroad cars.

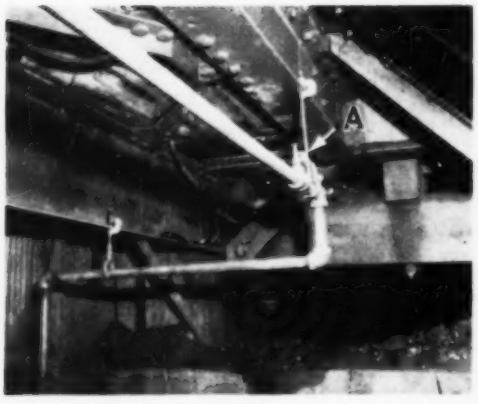
In the best of coal tipples, some fine coal dust gets into the air to settle on beams and in inaccessible corners, thus presenting an explosion hazard. To combat this hazard, the system was designed for installation of 18 rate-of-rise thermostatic releases, in addition to the usual complement of fixed-temperature sprinkler heads, which open at 160 deg. F.

C. W. Hutchinson, Inc., Huntington, W. Va., designed and installed the dry-pipe system at Slagle, using equipment furnished by the Viking Corp., Hastings, Mich. The job includes a 75,000-gal. wooden tank on the hillside above the tipple, two



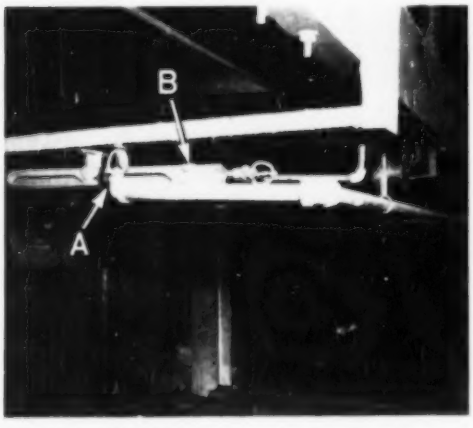
LOOKING INSIDE A CONTROL STATION. Dry-pipe valve and dry-pipe riser are at the right; small motor-driven air compressor and its automatic controls are at the upper left.

CONTROL STATION NO. 2 regulating the automatic sprinklers in the tipple proper is located at ground level between a loading track and a truck driveway.



FIXED-TEMPERATURE sprinkler heads such as this (A) under the second floor of the tipple are spaced on 8-ft. centers or closer.

UNITS ARE INSTALLED close to the flat roof of the tipple—fixed-temperature heads (A) and rate-of-rise thermostatic release (B).



PART OF THE PROTECTION for the belt conveyor on the second floor of the tipple is this fixed-temperature sprinkler head (A) and rate-of-rise thermostatic release (B).

WITH THE SPRINKLING-SYSTEM PIPING located near the roof of the supply house, which is not heated over weekends, a wet-pipe system was not possible. "A" indicates a sprinkler head.

control stations containing dry-pipe valves and a small domestic-type coal-fired heating furnace to heat the riser pipe in the tank in extremely cold weather.

In this dry-pipe system, 20 lb. of retarding air pressure is maintained in the sprinkler lines by a tiny compressor with full-automatic controls. This air pressure holds closed a Tyden Model C dry-pipe valve. When a fixed-temperature head or a rate-of-rise thermostatic release opens, the drop in air pressure opens the Tyden valve, thus permitting the water, at a 52-lb. pressure, to enter the system and pour from the affected sprinkler heads as soon as the trapped air has escaped from that particular section of the piping. The thermostatic releases function through a separate system of $\frac{1}{4}$-in. pipes to open the Tyden valve and put water into the system, so that sprinkling begins very quickly after a fixed-temperature head opens. Each rate-of-rise release has a fixed-temperature head affixed to it.

Two Control Points for System

Two control stations were installed. One, located in a small building erected against the side of the main supply house, controls the sprinklers under the wooden trestle and in the mine shop and supply house. The other, installed in a narrow space between a loading track and a truck driveway, takes care of the sprinklers in the tipple proper. Sprinkler heads are spaced on 1-ft. centers or closer under each floor and next to the roof. Heads also are installed under a horizontal belt conveyor about 4 ft. above the tipple floor.

All piping in the structure is installed so that it drains back to the control stations. The underground feed line from the high tank to the nearer control station is 8-in. and the extension to the second control station is 6-in., as also are the main risers from each control station. The minimum size of pipe—feeding a single head—is 1-in.

Reasons for installing this fire protection at McGregor Mines were, of course, purely economic, but the feeling that there is now only the remotest chance of the plant being destroyed by fire is worth a lot to the owners, executives and operating officials.

Exide IRONCLAD BATTERIES

HAVE ALL FOUR VITAL CHARACTERISTICS FOR SAFE, DEPENDABLE MINE HAULAGE SERVICE

1. **HIGH POWER ABILITY** . . . abundant reserve power plus an ability to discharge at high rates.
2. **HIGH ELECTRICAL EFFICIENCY** . . . hence low power costs.
3. **RUGGEDNESS** . . . to withstand hard usage.
4. **LONG LIFE and MINIMUM MAINTENANCE** . . . which add up to better service at a saving.

Because of these outstanding qualities, Exide-Ironclad Batteries are used by more mine operators than all other batteries combined.

Most batteries look much alike on the surface. But inside are the differences that determine power, performance and battery life. One notable difference in Exide-Ironclad construction is the positive plate.

THE POSITIVE PLATE consists of a series of slotted tubes which contain the active material (see small illustration at left). So fine are these slots that, while permitting easy access of electrolyte, they retard active material from readily washing out . . . thus assuring years of safe, dependable, day in and day out mine haulage service.

1888—Dependable Batteries for 61 Years—1949

If you have a special battery problem, or wish more detailed information, write:

THE ELECTRIC STORAGE BATTERY COMPANY
Philadelphia 32

Exide Batteries of Canada, Limited, Toronto

The Foremen's Forum

How Good Are You at Handling Mistakes?

This quiz is designed to help you in your supervisory work. Study the questions and check "Yes" or "No." Then turn to p. 100 for explanation.

1. Do you have the feeling that your men make a lot of mistakes? ..... Yes ☐ No ☐
2. Do you feel that your men should have enough sense not to make mistakes? ..... Yes ☐ No ☐
3. Do you hold your men responsible for about everything wrong that happens? ..... Yes ☐ No ☐
4. Do you feel that you have settled everything when you have bawled a man out for making a mistake? ..... Yes ☐ No ☐
5. Do you feel that you know your job, your men and your territory thoroughly? ..... Yes ☐ No ☐
6. Do you figure it is all right to take care of today's situations and handle tomorrow's when they come up? ..... Yes ☐ No ☐
7. Do you merely protest and let it go at that when the front office makes a mistake? ..... Yes ☐ No ☐
8. When you make a mistake, do you think it's best to forget it as quickly as possible? ..... Yes ☐ No ☐

How to Sell Changes

Sometimes, foremen don't get the results they hope for when they introduce new methods or new machines for mining coal. If they are disappointed, they often blame the machine or the method, claiming that it just won't work in their mine or section. However, it's a safe bet that some pretty good engineers designed the new machine and put it through some tough field tests, so it's likely to be all right. Likewise, the new method doubtless was worked out by top men with a lot of mining experience and should work well if given a fair chance.

It's safe to say, therefore, that most failures to get results from new methods or new machines grow out of the foreman's failure to "sell" changes to his men. That puts it up to the foreman. How can he "sell" his men on a new method, which may involve cutting down or adding to the size of a crew, a new way to develop a panel or a change in moving up pan lines? How can he put across a new machine or a modification in an old machine?

If you, as a foreman, have had trouble along these lines, here are a few suggestions:

1. Be sure, first of all, that you understand the change yourself, down to the last detail. Think it all the way through and try to picture it for yourself, making sketches and notes in your private note-pad. See what it means from the standpoint of time, tonnage, safety and the ability of your men to handle it.

2. Tell your men ahead of time what is coming up and give them a chance to get used to the idea. Above all, tell your key men, the ones you depend on to back you up and set the pace for the others. Don't try to spring a big surprise.

3. Plan your presentation in advance. Make notes, so that one step in your explanation follows another clearly and logically. Notes also will keep you from leaving anything out. Be ready to show how the new way is better or easier or safer than the old way. Figure out how the change will benefit every man in your crew, then sell it on that basis.

4. Tie the change in with job security, high wages and long life for your company. Show your men how increased output per day keeps the company in business, provides better jobs and helps pay coal miners the highest industrial wages in the world.

5. Follow through. Check up to see that things are going right and then, after the change has been in effect for a while, add up the benefits and tell your men about them.

Cable "Blow-Ups"; Safety Threat

By J. J. PLASKY
Safety and Training Director
Red Jacket Coal Corp.
Red Jacket, W. Va.

Four men were injured last month when electric cables which they were handling "blew up." Some of the injuries were slight, but any one or all of them could have been serious. In one instance, the cable "blew up" near the employee's face and it was fortunate that his eyes were not injured.

Poorly spliced cables are likely to present fire, contact, arcing and other hazards.

It pays to keep cables in good condition from the standpoint of safety and efficiency. Most of the "blow-ups" can be attributed to faulty workmanship in making splices. Temporary splices should be made in a workmanlike manner, electrically continuous, mechanically strong and insulated. Workmanlike manner means a neat job. Electrically continuous means that the conductors are connected in such a manner that their conductivity is equal to the original conductor. Mechanically strong means that the splice will have at least the same tensional strength as the original cable.

Insulated means that the insulation would be as good or better than the original insulation.

One method of making temporary splices is:

1. Remove 4 in. of the sheath of the cable to be spliced.

2. Designating the conductors as "A" and "B," cut Conductor A of one cable back 2½ in. and Conductor B of the other cable end a similar distance. This staggers the ends of the conductors.

3. Remove 1 in. of insulation from each of the four conductor ends, making sure that the wires are clean.

4. Slip a splicing clamp over the longer end of each conductor, then lap the conductors ¾ in. by meshing the conductor strands, after which slide the clamps into position and close them into a clamping position by means of a hammer. Many light blows are preferred to fewer heavier blows because there is less likelihood of damaging the conductor wires.

5. Insulate each part of the splice

Cost Cutters! B. F. Goodrich tires with double nylon shock shields

USERS' cost records speak loudly for B.F.Goodrich off-the-road Silvertowns built with double nylon shock shields. Here, for example, are two typical reports on savings — made by customers who use BFG Universal tires such as shown above.

One report says, "one-third more miles from B. F. Goodrich tires." Another: "Sixty-eight per cent of B. F. Goodrich tires removed over a certain period were repairable or recappable. Of the remaining tires removed, representing 3 other brands, only 20% were repairable or cappable."

One reason for such marked difference in performance is the *double nylon shock shield* built into all B. F. Goodrich off-road tires size 11.00 and larger. This shield consists of 4 layers of strong, elastic nylon cord built in between the tread rubber and the all-rayon cord body. The layers are in pairs; each pair running at scientifically determined angles with the other to give maximum strength — double bruise protection.

Under impact, the two plies of cords in the shields stretch together, not across each other, and return to their original position. Because of this action, impact is *distributed;* absorbed. The rayon cord body is shielded from shock.

Only from B. F. Goodrich can you get the added protection of the double nylon shock shield — the added savings through (1) longer tire life (2) increased bruise resistance (3) less danger of tread separation (4) more recappable tires.

In addition to nylon, Universal tires are built with a specially compounded, cut-resisting tread. And, note the Universal tread design — husky, wedge shaped cleats which protect the under tread and provide positive self-cleaning by forcing mud and dirt outward along the diagonal grooves.

Find out how B. F. Goodrich off-road Silvertowns can help you pare your operating costs. There's a Silvertown for every need, every job. Get in touch with your BFG Dealer or write us direct. *The B. F. Goodrich Company, Akron, Ohio.*

Truck Tires BY

B.F. Goodrich

with about 1/16 in. of rubber tape, following with an ample covering of friction tape over the whole splice.

—*The Red Jacketeer*

•

Handling Mistakes

"No" should be the answer to all but Question 5, p. 98. The reasons, based on generally accepted principles, are:

1. When a foreman gets to thinking that his men are a bunch of left-handed queers that can't do anything right, it is time for him to watch out. It is his job to see that they do their jobs and do them with a minimum of mistakes. In fact, that is what his boss expects of him. Therefore, if he is having trouble with a lot of mistakes, he should bore in and take stock to see if the fault is not at least partly his own. He should not be afraid to ask for advice from his boss. He gets a good mark for effort and quite likely will get some real help as well.

2. Assuming that man can go ahead and do his job without any help, advice or training is a sure road to mistakes. The foreman must always keep an eye on the way his men are working, and should be ready to show them the better ways and prove that they will get results.

3. Mistakes are not always intentional or a result of ignorance. Bad planning, a poor mining system, insufficient materials and equipment in bad shape can result in things going off on a tangent and getting messed up through no fault of the men. The foreman should, therefore, make sure that his working plan and equipment are in order and that the necessary materials are on hand.

4. Correcting a mistake is more than just a disagreeable chore. It is a real educational opportunity for the alert foreman. When a mistake occurs he first should find out why. Then, if the man was responsible, he should very carefully make clear why he was at fault and then follow up with a well-thought-out and detailed explanation of the correct method and what it means in terms of results. Thus, the foreman establishes the foundation for better work habits and an improved production record in the future. In addition, he wins the man's respect, friendship and cooperation—all most worthwhile to have.

5. As pointed out previously, the final responsibility for results falls on the foreman. It is up to him, therefore, to know his job, his men and his territory. With this knowledge, he can better direct the work to the end that mistakes are reduced to a minimum and production is raised to the maximum.

6. Some unexpected problems have to be handled on the spot and at the time they come up. But a little advance planning and thinking never hurt a production record, and if the foreman has thought ahead and laid his work out, the chances of mistakes are reduced to a minimum.

7. The foreman also has the problem of coping with mistakes that originate in the front office. Here, again, he has a real opportunity if he works it right. If he merely says the proposal is wrong, the boss may conclude he is merely being stubborn. The thing to do is to go back with a careful analysis of why the action is a mistake and then offer an alternative plan that will eliminate the error and get the job done the way it should be. In this way, the foreman gets results and also gets the credit for being on his toes and using some initiative, which doesn't hurt when promotions are being considered.

8. The foreman also can make mistakes on his own hook. Then what? If the fault was his, he might as well own up. A reputation as an alibier doesn't do a man any good in the long run. Having made a mistake, the next thing is to make sure that there will not be a second one of the same kind. Therefore, he should find out why he made the mistake and take steps to prevent a repetition. Thus, the mistake becomes an opportunity for accomplishing a most worthwhile improvement.

•

Cost!

Cost is what we pay for something we want, or think we want, or for some mistake we make.

Here in America the cost of almost everything is figured in dollars and cents. Very few of us are able to think any other way; one of our most common expressions is "What would it be worth in dollars and cents."

Suppose you were transported to a country where there was no monetary system. You would be at a loss to value what you wanted or needed. How would you get a dozen eggs or a pound of butter? You would have to learn to offer so many periods of labor, or something you could make (perhaps a pair of shoes) for your eggs, bread and butter. If you could make a pair of shoes for trade, you would first have to trade something else to get the hide.

In other words, money has almost no value in itself. It is simply a convenient custom that has been built up over many years and, even with money, if you go into a strange country, you have to learn values all over again.

Now then, suppose you take time enough in your own country to learn the value of various things other than in terms of dollars and cents.

What is friendship worth, what is love worth, what is health worth? What have you to offer in return? In other words what is your personal value, or are you "not worth a damn"?

Take another slant at it. What is a hair in your head worth? You may say "Oh nothing." But suppose I offer to do a day's work for you if you will allow me to pull one hair from your head for each minute I work—that would be a pretty low value for your hair.

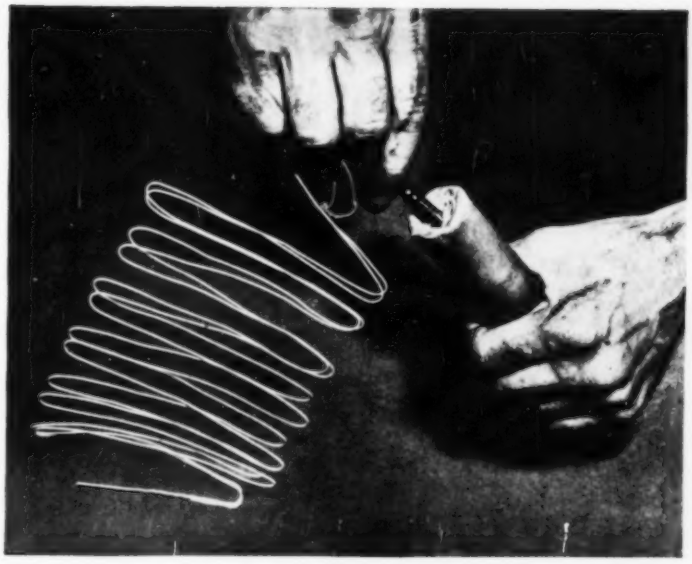
Take a finger. What is it worth? How much and what do you want to let me have one of your fingers? Or, say, a thumb, or an eye or an ear. I know a man who thought an automobile was worth two fingers but after the deal was completed he found he was very much the loser.

I also know a man who thought the chance of losing two or more toes, or perhaps a foot, was not worth the effort of keeping his foot off the rail, but after he had lost two toes, when it was too late, he would have liked to have called the deal off.

Perhaps with what is here written you can figure out what you are worth.

Do you value your hide as not worth more than a few flowers, a box and a 6-ft. hole in the ground or, are you worth paying constant attention to what you are doing?

—*Safety Bulletin*, Consolidation Coal Co. (W. Va.)



Exclusive Safety Features of Du Pont Electric Blasting Caps

Coal mine operators almost everywhere approve the exclusive safety features of Du Pont Electric Blasting Caps. These include:

- **Nylon-insulated wires**—resist abrasion, will not crack when wires are half hitched. They're white for easy visibility.
- **Rubber plug closures**—are double-crimped into cap shells and are securely held. Caps are fully protected against moisture.
- **Aluminum foil shielded shunts**—available only on Du Pont Caps—provide protection against premature firing through accidental contact with an electric current. They short circuit the bared ends of the wires for their entire length.

Du Pont Electric Blasting Caps for coal mining are provided with iron wires to facilitate removal from broken coal by magnetic separators. Wires are of standard lengths: 4, 6, 7, 8, 9, 10 and 12 feet.

Ask any Du Pont Explosives representative for information about the features and use of these popular Electric Blasting Caps and the products listed in the adjoining column.

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EXPLOSIVES DEPARTMENT
WILMINGTON 98, DELAWARE

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(ELECTRIC BLASTING CAPS—"NITRAMON"—PERMISSIBLES BLASTING SUPPLIES AND ACCESSORIES)

Best Sellers in the field of permissibles

DU PONT "MONOBEL" AA
The most popular permissible on the market. A real producer of big lump coal. Excellent water-resistance.

DU PONT "GELOBEL" C
High velocity, gelatinous permissible recommended for hard rock work. Exceptional water-resistance makes it a splendid dynamite for the wettest operations.

DU PONT "LUMP COAL" C
The slow, heaving action of this widely used permissible pushes the coal away from the face so that mechanical loaders can readily handle it.

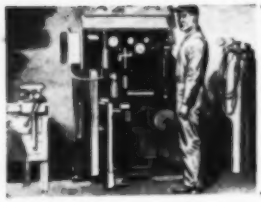
FOR EFFICIENT STRIPPING OPERATIONS
Du Pont "Nitramon"* blasting agent—the safest available—is ideal for coal stripping. Packed in watertight metal cans, it is easy to handle . . . easy to load, and may be safely loaded far in advance of firing time. Non-headache-producing . . . another important feature.

OTHER DEPENDABLE BLASTING SUPPLIES
Du Pont Rheostats
Du Pont Leading Wire
Du Pont Blasting Galvanometer
Du Pont Tamping Bags
Du Pont Connecting Wire

*Reg. Trade-mark for nitrocarbonitrate blasting agent.

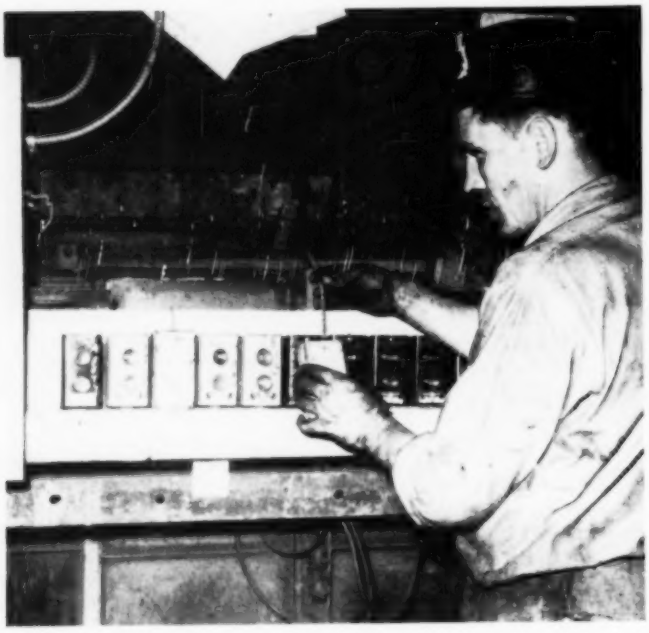
DU PONT

BETTER THINGS FOR BETTER LIVING
. . . THROUGH CHEMISTRY



Operating Ideas

Switch Guards Prevent Accidental Starting of Motors



NEW SAFETY COVER that prevents accidental starting of machinery while being worked on is placed over a motor pushbutton control by Sylvester Jannetta, tipple foreman, Blaine mine, Lorain Coal & Dock Co.

SPECIAL SAFETY COVERS for use on the pushbutton switches controlling the motors in the Blaine tipple of the Lorain Coal & Dock Co., Blaine, Ohio, have proven effective guards against the switch-panel operator or anyone else accidentally starting a motor while the equipment is under repair, with resulting injury to the repairman, writes Roy Schell, safety director of the company, in a recent issue of *The Lorain-Lorado Journal*.

The lightweight metal guards are so made that they can be slipped over any of the 18 pushbutton switches on the central control panel to cover the contactor buttons while the corresponding machine is being worked on. The guard is a constant reminder to the panel operator and others, since the switch cannot be operated without first removing the cover. When the work is completed, the cover is taken off. To prevent loss, the safety covers are attached by a chain to the control panel.

There have been several cases, states Mr. Schell, where men have been injured while working on a piece of equipment that has been accidentally started by someone not aware that work was in progress. While operating personnel can be instructed to check before starting a unit, the human element always is present. With these safety guards very little is left to chance or memory.

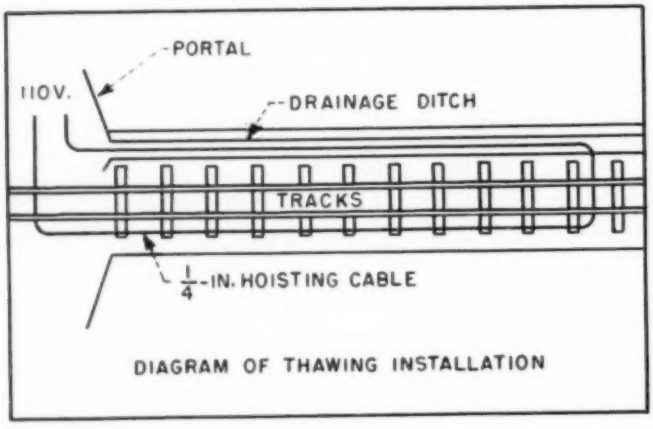


DIAGRAM OF THAWING INSTALLATION

Small Cable Thaws Ditch

A ¼-IN. HOISTING CABLE has been used as a heating element to thaw a drainage ditch that froze for several hundred feet near the portal of a mine tunnel, *Engineering & Mining Journal* has reported. The accompanying illustration showing the set-up of the installation was submitted by Dick May, Wallace, Idaho. The cable was hooked to the 110-volt secondary of an underground transformer. In one instance, the publication reported, a 700-ft. length of ditch was thawed. The circuit drew 30 amp, at 110 volts and the temperature of the cable was about 100 deg. F.

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- In every KING KOAL BELT is incorporated the essential qualities for economical conveying of coal with the positive assurance of long and uninterrupted service.
- For the ultimate in coal mine conveyor belting, specify KING KOAL CONVEYOR BELTS by

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How to Coil Welding Hose Without Kinks or Tangles

FIG. 1—LAY the first loop in the usual way. Then place your right hand over the hose, knuckles down, as shown.

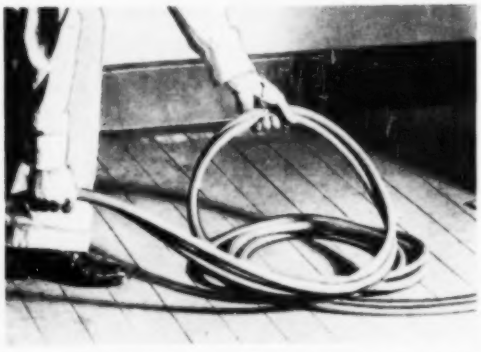


FIG. 2—ROTATE your right hand 90 deg. toward your body, knuckles up. Form the second loop by sliding the hose under itself.

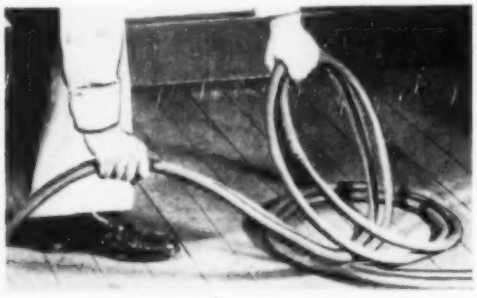


FIG. 3—LAY the third loop in the usual way. Then before you make the fourth loop, position your right hand as in Fig. 1.

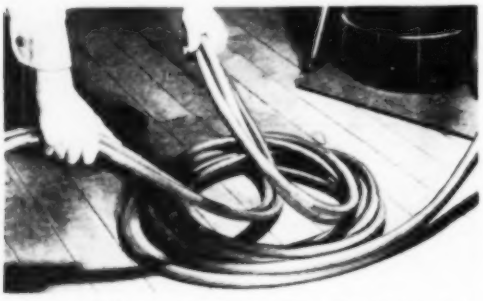


FIG. 4—ROTATE your right hand again and slide the hose under itself to form the fourth loop. The fifth loop goes over, the sixth under, and so on to the end.

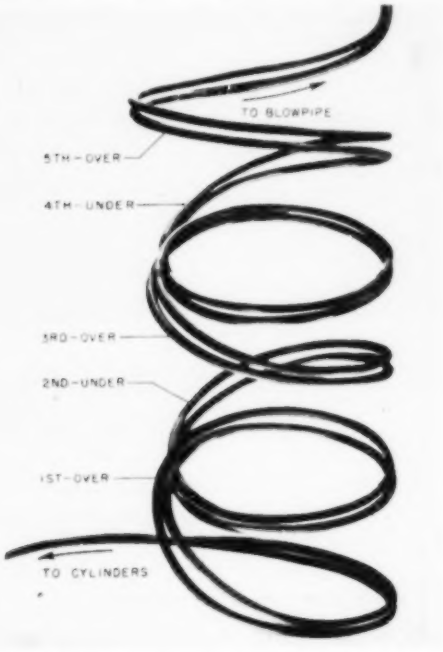


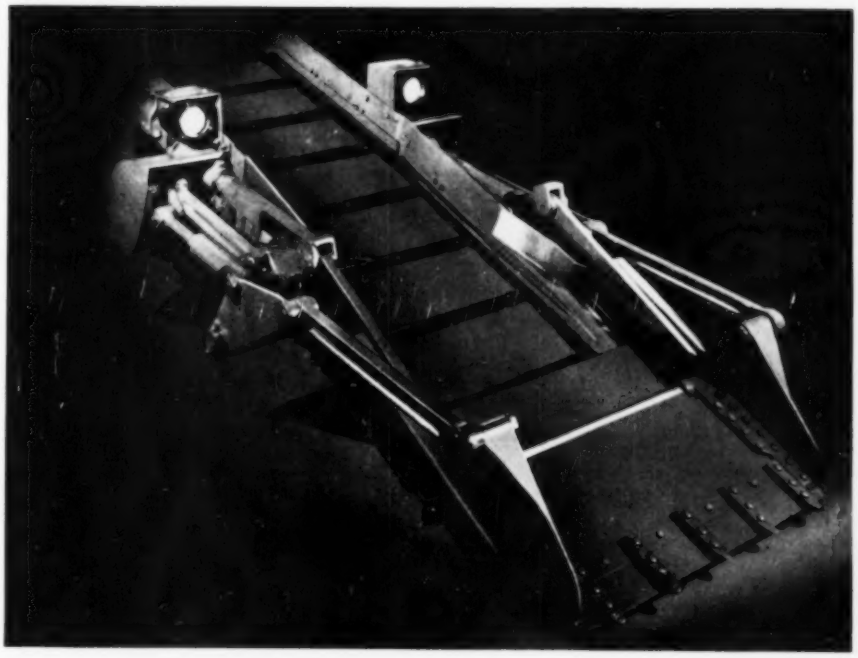
FIG. 5—EVEN-NUMBERED loops are slid underneath. When you uncoil the hose, the reverse twists of adjoining loops counteract each other so the hose doesn't twist.

—Reprinted from Linde TIPS, The Linde Air Products Co.

Don't Keep Your Accomplishments a Secret!

MANY MINING MEN read this section each month for new ideas and helpful kinks, so why not get the "credit" that would come from publication of your successful operating, mechanical, electrical or safety ideas. We will welcome your ideas and will gladly edit them and remake the drawings, if necessary. There's cash in it for you, too. COAL AGE, on publication, will pay you $5 or more for each idea. Why not write us today? Submit as many ideas as you wish—there's no limit!

DESIGNED FOR LASTING PERFORMANCE and Economical Maintenance

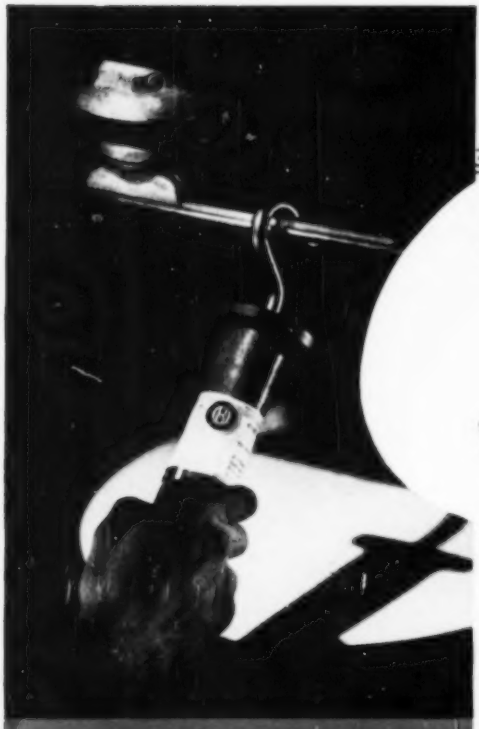


There are two reasons for the well known, lasting performance of the Whaley "Automat." First, the "Automat" is simple in design. All working mechanisms are strong, functional and smooth-working. The "Automat" is so organized that it is easy to get at the elements for that ALL-IMPORTANT MAINTENANCE. Well organized, simple elements make maintenance an easier job, save hours of maintenance time . . . a major economy factor in the operation of the "Automat." Perfect balance between parts reduces strain . . . requiring less power for operation. In addition, only the "Automat" gives you the safe, smooth shovel action . . . big capacity at less than 1/5 KWH per ton of material loaded. Only the "Automat" gives you equal efficiency whether you are loading coal, rock or slate. Myers-Whaley Co., Knoxville 6, Tenn.

Remember, the "Automat" loads, in its stride, any lump of coal that will pass through your tipple, or any lump of rock your cars, aerial tram or larriers, can take.

MYERS-WHALEY

MECHANICAL LOADERS EXCLUSIVELY SINCE 1908



Spending Dimes to Save Dollars!

Each dime you spend for O-B Fused Trolley Taps will safeguard many dollars of expensive cables, machine motors and production time. Cable burnouts cost money. So do motors damaged from overload. The simple fuse protection of an O-B Trolley Tap can prevent both. In addition, production shutdowns caused by burned out cables and overloaded motors will be eliminated.

Strong and ruggedly built, O-B Fused Trolley Taps have only four major parts—a fuse, two end terminals and an enclosing case. They weigh but slightly more than two pounds each and are available with four different types of wire attachment ends. Fuse ratings range from 3 to 400 amperes. If you are not already using O-B Fused Trolley Taps, order some today. The small price you pay is but a fraction of the value of the equipment they safeguard.

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TIGHT GRIP—Get good return circuit connections with O-B Plier-Type Ground Clamps

Provide perfect mechanical and electrical connections. Strong spring-kept jaws afford tight grip unaffected by twisting or vibration. May be attached to either bond cable, rail base or negative feeders as large as 1,000,000 cir. mil.

Ohio Brass

MANSFIELD, OHIO

News Round-Up

Featured in This Section

New Group to Study Industry Mobilization

Creation of a solid fuels task force by the National Security Resources Board to recommend improvements in mobilization plans for the solid fuels industries in event of a national emergency, as compared with those used during the last war, was recently announced.

Recommendations of the group will be reviewed by the board's solid fuel industries advisory committee, which is to be appointed. The task force consists of: chairman, William Hahman, acting director of the board's solid fuels division; Charles J. Potter, president, Rochester & Pittsburgh Coal Co.; Carlton R. Mabley, general manager, industrial sales, Island Creek Coal Sales Co.; George A. Lamb, Pittsburgh Consolidation Coal Co.; Robert F. Duemler, D., L. & W. Coal Co.; and Samuel Weiss, American Coke & Chemical Institute.

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Bituminous Council Urges Synthetic-Fuel Action

Reports dealing with synthetic liquid and gaseous fuels, coal-conservation research and appraisal of coal reserves were adopted by the National Bituminous Coal Advisory Council at its quarterly meeting in Washington, Dec. 8.

In discussing its plan to implement government and private industry programs for synthetic fuels, the council called for immediate coordination between the coal, gas and oil industries. The three-point program urged by the council included: (1) increased research and development to find more ways of using coal conveniently and efficiently; (2) substitution of coal for heavy fuel oils and natural gas where it is feasible to convert such gas and and oils into gasoline and distillates; (3) careful planning to see that synthetic fuels come onto the fuel market as needed.

A second report accepted by the council covered two coal-conservation research projects, one on the factors affecting pillar extraction and coal recovery, and the other on appraising the performanee of selected preparation plants. The council proposed that the U.S. Bureau of Mines study both projects in cooperation with its coal conservation committee.

The third report, that of the council's coal resources committee, urged the rapid re-appraisal of the bituminous coal east of the Mississippi River. The council also acted to expand the coal resources committee by adding additional representatives from the western states and instructed the committee to study plans for study of coal reserves west of the Mississippi. Lack of up-to-date and accurate appraisal of coal resources, together with diminishing reserves of high-grade coking coals and the possibility of unprecendented demand for coal for synthetic-liquid fuels make speedy and accurate surveys necessary, it was said.

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National Coal Names Three Committees

Appointment of the 1949 National Coal Association committees on safety, land use and vocational training and education was made last month by Charles A. Owen, president of the association. In selecting membership of the newly created vocational training and education committee, Mr. Owen pointed to the considerable progress made in this direction by M. D. Cooper, N.C.A. director of vocational training, and emphasized the intensification of the program through the services of the new committee. Membership of the committees are as follows:

Safety Committee: continuing as chairman, L. C. Campbell, vice president, Coal Division, Eastern Gas & Fuel Associates; S. J. Craighead, vice president, U. S. Fuel Co.; D. H. Devonald, vice president, Peabody Coal Co.; David L. Francis, president, Princess Elkhorn Coal Co.; P. C. Graney, president, Gulf Mining Co.; George R. Higinbotham, vice president, Consolidation Coal Co. (W. Va.); Harry LaViers, vice president, South-East Coal Co.; Charles O'Neill, president, United Eastern Coal Sales Corp.; O. B. Pryor, vice president of mining operations, The Valley Camp Coal Co.; George H. Rupp, manager, mining department, Colorado Fuel & Iron Corp.; and R. E. Snoberger, president, Binkley Coal Co.

Land-Use Committee: chairman, R. H. Sherwood, president, Central Indiana Coal Co.; William L. Burt, president, Greenland Coal Corp.; William H. Cooke, president, Little Sister Coal Corp.; L. Russell Kelce, vice president, Hume-Sinclair Coal Mining Co.; T. F. McCarthy, vice president, Clearfield Bituminous Coal Corp.; George E. Nettels, vice president, Pittsburg & Midway Coal Mining Co.; and Henry G. Schmidt, president, Powhatan Mining Co.

Vocational Training and Education Committee: chairman, Henry C. Woods, chairman of the board, Sahara Coal Co.; Charles Dorrance, president, West Virginia Coal & Coke Corp.; L. Eberole Gaines, president, The New River Co.; George M. Jones, Jr., vice president, Cambria Mining Co.; A. F. McElhenie, vice president, Pittsburg & Midway Coal Mining Co.; Charles J. Potter, president, Rochester & Pittsburgh Coal Co.; and Richard T. Todhunter, Jr., general manager, Barnes & Tucker Co.

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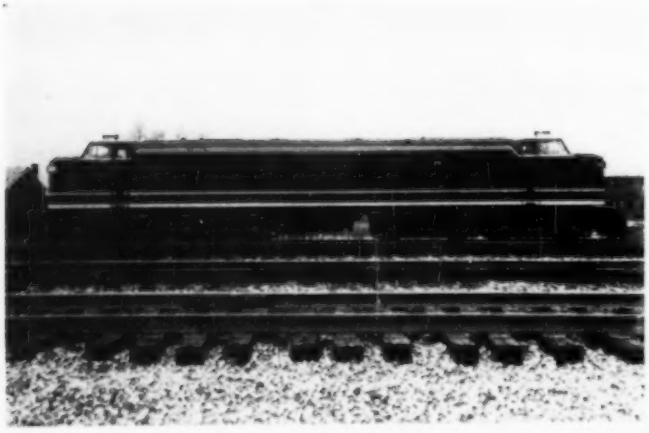
To Seek Federal Funds For Synthetic Fuels

Congress is to be asked by the Department of the Interior to appropriate about $800,000,000 to start a synthetic gasoline and oil industry, it was reported at the end of November. The proposal would be the first part of a program designed to provide sufficient commercial plants to overcome a fuel shortage in case of war. Total cost of the entire program now is estimated at $12 billion.

A bill introduced into the last Congress, but not acted on, called for expenditures of $350,000,000 as the first part of a plan that would total $9 billion. Reportedly, the increase in cost is a result of the desire of the Interior Department and the Army to build plants in Alaska as well as in the United States.

The program advocated last year by the two departments called for the eventual production of 2,000,000 bbl. a day of synthetic oil and gasoline from coal and oil shale.



First Gas-Turbine-Electric Locomotive on the Rails

This Alco-GE 4,500-hp. unit, the first gas-turbine-electric locomotive to be built and operated in the United States, began track tests Nov. 15 at the General Electric plant at Erie, Pa. It is to be placed in operation on a demonstration basis by the Union Pacific R.R. this spring, after preliminary tests have been completed in the east.

Stressing the developmental status of the new locomotive, representatives of the American Locomotive and General Electric companies pointed out that lengthy factory and road tests must be conducted before any real indication of the ultimate success of gas-turbine-powered locomotives can be obtained.

Although the gas turbine currently is fired by Bunker C oil, the companies are hopeful that special research efforts, coupled with experience gained from the operation of this first unit, may lead to the development of successful means of burning coal in a gas-turbine locomotive. Both companies are cooperating with the Locomotive Development Committee of Bituminous Coal Research, Inc.

The new locomotive is of single-cab construction with an operating station in each end and has B-B-B-B running gear. It develops 53 hp. per foot of length, weighs 500,000 lb. and has a continuous tractive effort of 68,400 lb. at 23.4 m.p.h. It is 83 ft. 7½ in. long inside of knuckles; 15 ft. 4 5/16 in. high over cab; and 10 ft. 7 in. wide over hand rails. Geared for 79 m.p.h., the locomotive carries enough fuel for 12 hours' operation at 4,500 hp.

Santa Fe Tests Coal Locomotive

Conversion by the Santa Fe Ry. of one of its largest freight locomotives from oil to coal and actual running tests to determine comparative fuel costs were reported early last month. According to reports by the Raton, N. M., *Daily Range*, which are unconfirmed by company officials, "coal proved so economical that other freight locomotives would be soon converted." The locomotive was placed on the Raton-Albuquerque, N. M., run.

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Anthracite Advertising Set at $650,000 in 1949

An expenditure of $650,000 for advertising in 1949 to promote the use of anthracite and its heating equipment was approved last month by the board of directors of the Anthracite Institute.

The new campaign, which will be a continuation of the major advertising and promotion activities initiated by the institute in December, 1947, will continue with newspapers in the major anthracite markets as the chief media, supplemented by space in key trade magazines. A smaller campaign also will appear in home and homecraft magazines. Copy will stress anthracite's availability and automatic-equipment advantages, with additional themes being developed for use later on in the campaign. Anthracite marketing authorities reportedly credit the 1948 program with being a definite factor in slowing up the sale of competitive heating equipment.

"In planning next year's promotion of anthracite, the Anthracite Institute has been guided by the success of the past year's advertising and promotion," said Frank W. Earnest Jr., president of the institute. "The spring fill-up campaign, a trend toward consumer interest in home heating with hard coal instead of other fuels, and current sales records in modern automatic anthracite equipment, all, I feel sure, were influenced to an important degree by the timely and persistent advertising of the past year," he said.

"The 1949 campaign will continue to feature consumer service and dealer training aids and to promote hard-coal information being made available to its 20,000,000 users, in addition to its paid advertising campaign." In addition, the "institute's program of research in the Wilkes-Barre laboratories and its regional activities will be stressed more strongly than ever in 1949," Mr. Earnest reported.

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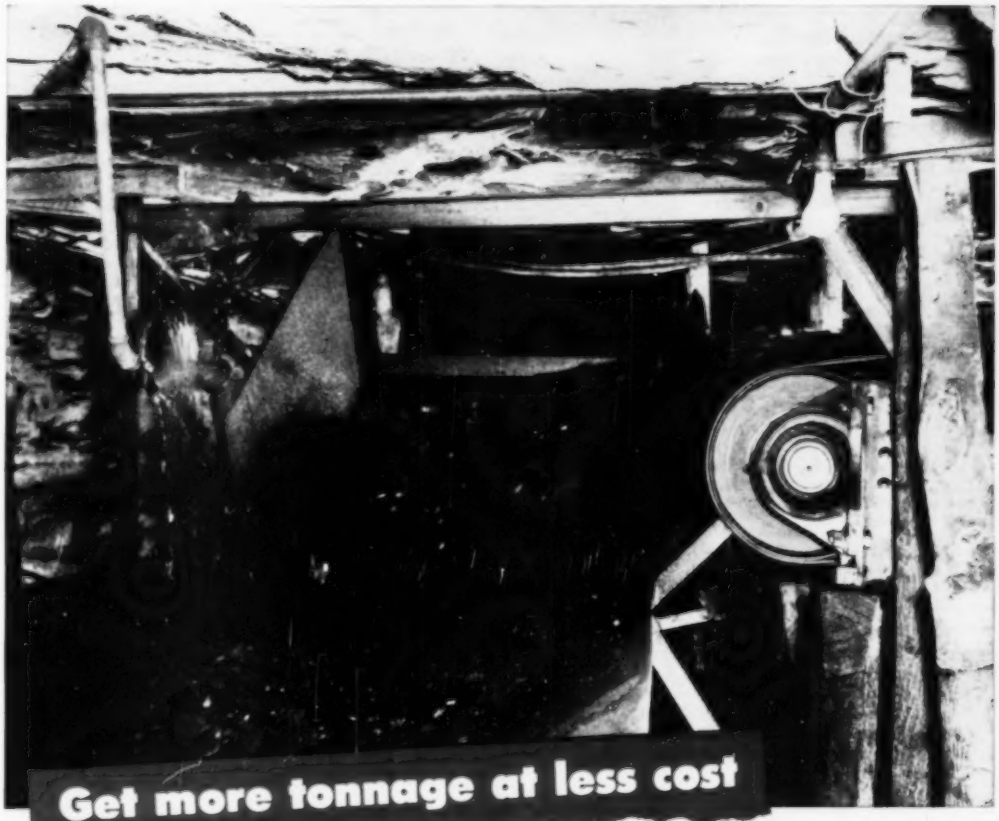
Johnstown Coal & Coke Provides Pension Plan

Adoption of a retirement plan for the 225 supervisory, technical and clerical employees of the Johnstown Coal & Coke Co., Vindex Stores, Inc., and The Crichton Co., was announced last month by Andrew B. Crichton, president of the companies. The entire cost of the plan will be borne by the companies and no contributions will be required of employees. Effective retroactively as of Jan. 1, 1948, the plan will provide, depending on earnings and length of service, with few exceptions, a yearly retirement income of between 30 and 70 percent of the individual's final earnings.

The normal retirement age established under the plan is 65 for male employees and 60 for female workers. Special arrangements may be made for earlier retirement. New employees are eligible to participate after completing one year's service.

In operation of the plan, the companies will make regular payments to a trust fund to be administered by the City Bank Farmers Trust Co., New York. David Stone, actuary, of Newark, N. J., who assisted in setting up the plan, will be retained to make annual audits of the fund to insure its actuarial soundness at all times. The plan will be administered by a retirement committee composed of the following officials of the Johnstown Coal & Coke Co.: W. G. Crichton, vice president; W. D. Hughes, general manager in charge of operations; and C. N. Crichton, assistant to the president, chairman of the committee.

Establishment of the plan, company officials pointed out, is an additional step in the companies' over-all program that includes life insurance, hospitalization and surgical benefits for employees and dependents and other assistance to employees, all designed to improve their general welfare and provide them with a greater measure of financial security in their later years. Payments into the U.M.W.A. Welfare and Retirement Fund for the benefit of unionized employees now are being made at a rate totaling nearly $400,000 a year, officials reported. The affiliated companies operate 10 mines and four stores and have a total of more than 2,000 employees.



Get more tonnage at less cost

Mechanize with Robins Mine Conveyors . . . benefit by advantages which no other mine conveyor offers

If you want your output to go up and costs down, mechanize your mine with Robins Mine Conveyors.

That's exactly what the Union Colliery Company did at its New Kathleen mine. This company installed eight Robins Mine Conveyors. Each of these conveyors is 36" wide with centers of 1,300 feet at present—extensible to about 2,000 feet. Each speeds coal out of the mine at rates up to 600 tons an hour.

Like other profit-minded operators, Union Colliery knows that only the Robins Mine Conveyor is engineered as a complete unit . . . with *machinery and belt provided by a single organization.* In fact, Hewitt-Robins Incorporated is the only company that assumes full responsibility for both elements.

Uneven mine floors are no problem. Standard Robins Mine Conveyors are available for level, uphill or downhill operation. Less headroom (only 15" to beltline on the intermediate and tail sections) enables them to work in low seams. And rigid or demountable 8- or 10-foot sections can be dropped in place as required, to extend the conveyor without use of tools.

You get strength without excessive weight. You have a choice of internal or head drive . . . of internal or tail takeup. And you are also sure of simple, positive lubrication . . . thanks to exclusive One-Shot Lubrication of Robins Idlers—*which have full four-inch diameter steel pulleys.*

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ROBINS CONVEYORS DIVISION **HEWITT-ROBINS INCORPORATED**

Personal Notes

Henry F. Warden has been elected president of The American Coal Co. of Allegany Co., McComas, W. Va., the Mill Creek Coal & Coke Co., Coopers, W. Va., and the Wm. C. Atwater & Co., Inc., their affiliated selling company. Mr. Warden, who has been vice president and general manager of the operating companies for some years, succeeds the late William C. Atwater Jr. **Harry W. Payne**, general superintendent of mines for American Coal and Mill Creek since 1935, has been named general manager to succeed Mr. Warden. Mr. Payne has been associated with the organization for 33 years, first joining American Coal as a payroll clerk in 1915.

W. Howard Adams, superintendent of mines, Elkhorn Junior Coal Co., Thornton, Ky., for many years, has resigned. **Curt Giles**, mine foreman for the company, has been named to succeed Mr. Adams.

C. L. Lambert has been appointed general superintendent, Atlantic Smokeless Coal Co., Asco, W. Va., succeeding **C. L. Atkinson**, resigned.

EUGENE McAULIFFE, retired chairman of the board of trustees of the Union Pacific Coal Co., Omaha, Neb., has been selected by the A.I.M.E. as the first recipient of the Erskine Ramsay Gold Medal. The medal and certificate of award, which was recently established in recognition of distinguished achievement in the production, beneficiation or utilization of bituminous or anthracite coal, will be presented to Mr. McAuliffe at the institute's annual banquet to be held at the Palace Hotel, San Francisco, Feb. 16. Mr. McAuliffe, who has been active in the coal industry for more than 50 years, was president of Union Pacific Coal from 1923 until 1944, when he was made chairman of the board of trustees, from which he retired Jan. 1, 1948.

Richart Leaves Coal Age To Join C. W. & F. Staff

Ralph R. Richart, associate editor, *Coal Age*, has resigned, effective Jan. 1, to join the engineering staff of the Chicago, Wilmington & Franklin Coal Co., with offices in Benton, Ill. His first assignment is expected to be in connection with the construction of the preparation plant to be erected at the company's new Orient No. 3 mine near Waltonville, Ill.

Mr. Richart, who is a professional electrical engineer, became associated with *Coal Age* in December, 1943. He has traveled extensively throughout the major coal fields of the country in the preparation of material for *Coal Age* and is highly regarded by operating men for his technical articles on coal preparation, electrification and underground and stripping operations.

A graduate of the University of Illinois with a B.S. degree in railway electrical engineering in 1927, Mr. Richart received the professional degree of electrical engineer from the same institution in 1932. Upon graduation from Illinois, he took the General Electric test and arc-welding courses and from 1929 to 1931 was engaged in the electrification of the Cleveland Union Terminal Co. He was electrical and mechanical supervisor, Seymour Coal Co., 1933-36; electrical engineer, Kathleen mine, Union Colliery Co., 1936-40; engaged in coal-briquetting research for the Illinois Geological Survey, 1940-41; civilian instructor, Air Corps Mechanics' School, Chanute Field, 1941-42; and electrical engineer, Allen & Garcia Co. 1942-43.

William R. Mackie has been elected president, Mackie-Clemens Fuel Co., Kansas City, Mo., succeeding the late Andrew M. Hanna. Mr. Mackie has been associated with the Mackie-Clemens Fuel Co. and the Clemens Coal Co., Pittsburg, Kan., since 1938, except for his service with the armed forces from 1942 to 1946.

R. J. Burmeister, vice president and general manager, has been elected president, Raleigh Coal & Coke Co., Raleigh, W. Va., succeeding the late Mrs. Carrie M. Wright. **Ellsworth H. Shriver**, formerly assistant general manager, has been named vice president and general manager to succeed Mr. Burmeister.

Edward C. Page has been elected president of the Crozer Coal & Land Co. and the Page Coal & Coke Co., Philadelphia. **Samuel A. Crozer** has been named vice president and assistant secretary, and **Warren F. Leatherman**, secretary-treasurer of the two companies.

Ralph E. Moore has been named assistant manager in charge of production and **Daniel Moore**, treasurer, of C. A. Hughes & Co., Cresson, Pa. Both are sons of Ralph H. Moore, president of the company. **James Froggatt**, mining engineer, has been advanced to assistant general superintendent of mines.

W. D. Hughes has been appointed general manager in charge of operations, Johnstown Coal & Coke Corp., Johnstown, Pa. **John N. Crichton** has been named general manager for the company's Pennsylvania mines and **R. D. Joseph**, general manager of its Maryland and West Virginia mines.

Richard W. Storey, engineer, Consolidation Coal Co. (Ky.), Jenkins, Ky., has been promoted to assistant chief engineer, serving under R. J. Howard, chief engineer. **Marshall E. Prunty**, formerly superintendent, Mine No. 204, has been named safety director for all operations of the company. Consol has announced that Mine No. 204 has been consolidated with Mine No. 207 as the two mines are interconnected and 207 is about worked out. **William Stapleton**, superintendent, Mine No. 207, has been appointed superintendent of Mine No. 204 also.

Thomas Blackburn has been named superintendent of the Gordon, W. Va., mine of the Dorothy Gordon Mining Co., succeeding **J. C. Tolliver**, resigned. Mr. Blackburn has been associated with the company for some years.

James Figate, former district mine inspector, has been renamed a Kentucky state mine inspector with headquarters in Madisonville. Mr. Figate had previously been connected with the Kentucky department for a number of years and more recently had been superintendent of several operations in Hopkins County.

Jerome C. White, Ebensburg, Pa., has been appointed manager of the Cambria division, Bethlehem Collieries Corp., which comprises the three mining companies acquired by Bethlehem last fall in the purchase of the J. H. Weaver Co. (*Coal Age*, November, 1948, p. 120). Mr. White was assistant vice president in charge

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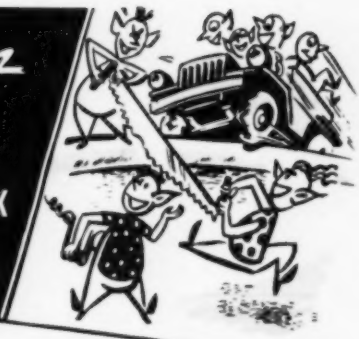

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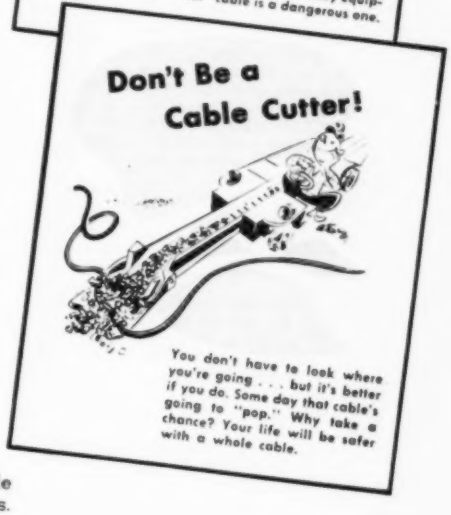

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of operations for the Weaver company and had been expected to continue in charge for Bethlehem.

Hugho H. Machin, Boulder, Colo., a Colorado state coal mine inspector for 28 years, reportedly is retiring. Since 1937, Mr. Machin has covered Boulder, Weld, Larimer and Jefferson Counties.

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Obituaries

Charles Enzian, consulting engineer with offices in Wilkes-Barre and Hazleton, Pa., died Dec. 7 in Wilkes-Barre a few moments after a sudden collapse from a heart attack. Mr. Enzian, who was a graduate of Lehigh University, had been associated with the anthracite and bituminous coal industries for 50 years. He had been active in mine safety work and had done considerable mine research for the government.

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Association Activities

Harlan County Coal Operators' Association, Harlan, Ky., at its annual meeting Nov. 17, elected as president C. V. Bennett, president, Harlan Central Coal Co., succeeding Pearl Bassham. R. C. Scott, general manager, Cornett-Lewis Coal Co., Inc., was named vice president, and George S. Ward was re-elected secretary-treasurer. Named members of the executive board were: Pearl Bassham, Kenes Bowling, R. W. Creech, Jr., W. J. Cunningham, S. J. Dickenson, F. L. Dupree, J. S. Greene, C. S. Guthrie, Elmer D. Hall, J. E. Taylor and A. F. Whitfield Jr. The business session during the day was followed by a reception and the 32nd annual banquet of the association that evening. Toastmaster at the banquet was Judge Charles I. Dawson and speakers included John K. Dent, vice president, L. & N. R. R.; J. E. Tobey, president, Appalachian Coals, Inc.; Joseph Moody, president, Southern Coal Producers' Association; and James W. Haley, secretary and general counsel, National Coal Association.

MEETINGS

● **Stoker Mfg.'s Association:** general meeting, Jan. 27, LaSalle Hotel, Chicago.

● **A.I.M.E.:** annual meeting, Feb. 14-17, Fairmont Hotel, San Francisco.

Illinois Coal Operators' Association, at a recent meeting, re-elected all officers and directors, as follows: president, George F. Campbell, president, Old Ben Coal Corp., and head of the group since 1941; vice president and labor commissioner, J. Roy Browning; treasurer, C. W. Petersen, treasurer, Bell & Zoller Coal & Mining Co.; secretary, Fred S. Wilkey; and general counsel, T. G. Essington. Directors re-elected include: Mr. Browning; D. W. Buchanan, chairman of the board, Old Ben Coal Corp.; D. H. Devonald, vice president, Peabody Coal Co.; George B. Harrington, president, C. W. & F.; Hubert E. Howard, chairman of the board, Pyramid Coal Corp.; E. R. Keeler, chairman of the board, Franklin County Coal Corp.; T. C. Mullins, president, Northern Illinois Coal Corp.; T. J. Thomas, president, Valier Coal Co.; A. H. Truax, president, Truax-Traer Coal Co.; and William P. Young, president, Bell & Zoller Coal & Mining Co.

Indiana Coal Preparation and Utilization Society, at its meeting Dec. 13 in Terre Haute, elected as president, C. Richard Templeton, Templeton Coal Co., Terre Haute. Elected first vice president was Joseph W. Anstead, Linton-Summit Coal Co.; second vice president, William G. Stockton, Walter Bledsoe & Co.; and secretary-treasurer, C. C. Lydick, managing director, Coal Trade Association of Indiana. Named directors of the society were: Percy Galeener, Snow Hill Corp.; Tom E. Raab, Industrial Supply Co.; Hugh B. Lee Jr., Maumee Collieries Co.; Senior Richey, Sterling-Midland Co.; Richard H. Swallow, Ayrshire Collieries Corp.; James R. Mitten, Central Indiana Coal Co.; and Bradford Ingle, Ingle Coal Corp.

Western Kentucky Mining Institute, Madisonville, Ky., has elected the following officers: president, Andrew Roark, Graham; first vice president, L. Cobb, Nortonville; second vice president, A. L. Bishop, Madisonville; third vice president, Tolley Eli, Dawson Springs; secretary-treasurer, Thomas Long, Madisonville; and assistant secretary-treasurer, Edwin M. Wheatcroft.

Frisco Coal Operators' Association has elected as president Henry F. DeBardeleben, president, DeBardeleben Coal Corp., Birmingham, Ala., to succeed his father, the late Henry T. DeBardeleben. Other officers elected were: first vice president, W. F. Cobb, president, Galloway Coal Mining Co.; second vice president, J. H. Moore, vice president, Brookside-Pratt Mining Co.; treasurer, C. C. Williams, vice president, Alta Coal Co.; and secretary, C. J. Thompson, coal-car agent, St. Louis-San Francisco Ry.

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New Developments

● Purchase by the Union Carbide & Carbon Corp. of the stripping operations of Testa Bros., Inc., in Noble County, Ohio, previously reported in the negotiation stage (*Coal Age*, December, 1948, p. 136), has been completed. The sale, which does not include the Testa properties in southern Ohio and West Virginia, was reported to involve approximately $1,000,000. Union Carbide is understood to be planning expansion of the operation on a much larger scale, with development of the Nos. 6 and 7 seams. The coal will be used in plants being erected by the company near Marietta, Ohio.

● Acceptance of the offer of the Reading Briquet Co., a subsidiary of the Philadelphia & Reading Coal & Iron Co., to purchase for $1,700,000 the two anthracite briqueting plants operated by the Reading company under a royalty-lease agreement since their erection during the war, has been announced by the WAA. Located at Locust Summit and St. Nicholas, Pa., the plants have a total capacity of 500,000 tons a year. They were built by the federal government to augment the nation's fuel supply during the war, at a cost of $2,965,000.

● Plans for the opening of the old Diamond mine, West Scranton, Pa., idle since 1939, recently were announced by the Moffat Coal Co., Scranton, which has leased the mine from the Glen Alden Coal Co. Work has already been begun on reconditioning the mine, including construction of railroad tracks and a tipple at the old Diamond slope. Actual production is expected some time this summer and about 300 men will be employed. Coal produced at the operation will be hauled by railroad to a nearby breaker for preparation.

● Preliminary work on the development of its new Porter Tunnel mine near Tower City, Pa., has been started by the Philadelphia & Reading Coal & Iron Co., Pottsville, Pa., it has been announced. A preliminary agreement has been reached with a tunnel contractor for the driving of a 4,200-ft. rock tunnel, which is expected to cost $1,500,000 and tap virgin coal above water level that will yield an estimated 10,000,000 tons of prepared coal. While completion of the tunnel is expected to require about 1½ years, the company will start actual mining of coal as soon as the tunnel reaches

"Give us the tools . . ."

What Are *YOUR* Chances If There Are No Profits?

Since the November 2 election there has been a dazzling variety of plans to have the government do more and more things and spend more and more money. But there is almost no variety in the plans which are suggested to raise the money.

"Pay for it by taxing profits," is the standard refrain. Slap on an "excess" profits tax. Boost the corporations' income tax rate.

Well – why not? Haven't the corporations been making so much money that a big chunk of it can be turned over to the government spenders without hurting anybody?

The answer is no!

How high profits should be can be debated endlessly. Some people claim that 1948 corporation profits, which will amount to about $20 billion, are too high. They emphasize the fact that profits are larger in relation to investment than they were a few years ago. Other people think profits are low. They stress the fact that profits are not much larger in relation to sales than they have been historically. Both sides agree that in some individual cases profits have been too high, as in others they have been too low or non-existent.

But if we cut the total volume of profits drastically, we shall do so at our national peril.

There is no room for debate about that. For we shall choke off the crucially important job of building new plants and equipment for our industries. Squeeze hard enough, and America will go the way of Britain – down the long and painful skids of industrial decline. Widespread unemployment, especially among our industrial workers who produce new plants and equipment, will mark the dreary way. Here is a fact which the President, the Congress, the C.I.O., and all of us have a real reason to remember:

Almost two-thirds of all profits today are going to rebuild and improve plants and equipment.

More than $13 billion of this year's profits are being plowed back. They are going – as a large proportion of profits have always gone – to buy for workers better tools to work with, better surroundings in which to work. They are making possible better products, and more of them, for all of us.

The figures below show how companies have put more and more profit-dollars and a larger share of their profits to work in the business:

YEAR	PROFITS REINVESTED	% OF TOTAL PROFITS
1929	$2.6 billion	31%
1939	1.2 "	24%
1943	5.9 "	57%
1944	5.2 "	53%
1945	4.2 "	47%
1946	6.9 "	55%
1947	11.2 "	62%
1948 est.	13.0 "	65%

continued on next page

The record shows that each of us is the real beneficiary of this plowing back of profits.

Every American has benefited from these profits. Each dollar that business has put into its plants and equipment in the last thirty years has increased our yearly production by 35 cents.

This re-investment of profits has helped make possible a 75% increase in living standards since 1919.

It has helped increase wages from an average 48 cents an hour in 1919 to $1.36 today. Allowing for higher prices, that increase means that an hour's work today will buy twice as much as it did thirty years ago.

Why must business retain these billions of profits to improve its plants and equipment? Why must it plow back more and more? *The reason is that business already is caught in a tax squeeze.*

Federal taxes alone take at least thirty-eight of each one hundred dollars a company earns. Then, if the company pays out to its stockholders any part of what is left as dividends, the federal personal income taxes of the stockholders may take up to 77% of those dividends. Under these conditions, so few people are willing to invest in industry that the stock market is stagnant. Companies can not raise in that market the money they need for improvements.

The result: business must rely more and more on plowed-back profits to pay for new plants and equipment.

We know that everywhere in industry new and better ways of producing goods are standing ready for use. The previous editorial in this series mentioned some of them. We know, too, that depression and war put our industries far behind schedule – as much as $100 billion behind – in getting the new tools they should have had to keep themselves in first-class shape. McGraw-Hill is now completing a survey of industry that will measure these needs. The results will be published in this editorial series. We know already that in 1949 alone industry will need $18 billion or more for this purpose.

And all but a small fraction of that sum must come from profits.

Our prosperity, our strength as a nation, our hopes for better living depend on our continuing to generate and to plow back a large volume of profits.

For that reason we should not thoughtlessly follow these people who propose to pay for any and all new government activities by saying simply, "Soak the corporations." There is no need to follow them. There are other ways of obtaining necessary funds.

First and foremost should be economy within the government itself. If its citizens must pay still higher taxes, then surely government should exercise rigid self-restraint, cutting out all but the most essential activities and expenses.

After economy should come consideration of a broader federal tax base.

If these and other methods of raising money are inadequate and if taxes must take a bigger bite from business profits, two facts are clear. We should not adopt an "excess" profits tax with all of its complications and all of its corrupting effect on business. A moderate increase in the regular income tax on corporations is much less dangerous. *But even such an increase, if necessary, should be accompanied by special allowances for expansion and depreciation that will encourage companies to continue spending their earnings for new plant and equipment.* We all have a stake in that.

At this critical juncture in our history profits have a new and vastly more important role than they have ever had. In unprecedented degree they are the drive behind our present prosperity and the key to a better, stronger future.

Give profits the axe and the blow does not stop there.

It cuts into the employment, the prosperity and the strength of our nation.

Everyone of us has a stake in how the President and Congress handle taxes on profits – and now is the time to remind them of that stake.

James H. McGraw, Jr.

President, McGraw-Hill Publishing Company, Inc.

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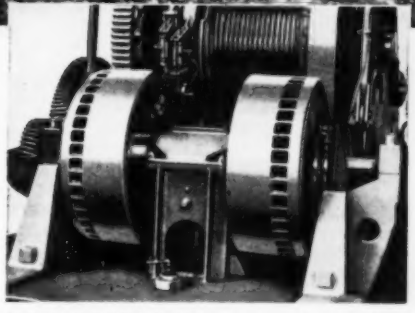

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Green Valley Mining Institute Officers

PRESIDING at the first annual Thanksgiving dinner meeting of the Green Valley Mining Institute, held at Central City, Ky., Nov. 23, were Robert J. Hagan (left), assistant secretary-treasurer, Arthur M. Wilson, president, and L. S. Loving, secretary-treasurer. The dinner was followed by musical entertainment and an address by Garrett L. Withers, chairman, Kentucky State Highway Commission.

the first practicable coal vein. When full production is reached, the operation will employ an estimated 500 men.

The most modern mining equipment and safety devices will be installed in the Porter Tunnel mine, making it the most modern mine in the anthracite industry and one of the most modern in the country, according to the company. A modern primary cleaning plant, to be located near the tunnel mouth, will provide preliminary cleaning for the run-of-mine, and the coal will be prepared at the Westwood breaker of the Stevens Coal Co. As a temporary measure, the coal will be hauled from the cleaner plant to the breaker by truck.

The new development is the first underground operation in 10 years for the company in the Tower City area. Its Brookside colliery was in operation from 1892 until its closing in August, 1938, because of economic and market conditions. A washery operated in recent years for the recovery of small sizes is now closed, but is to be replaced by a new and modern washery at Sheridan already under construction. The property being developed by the Porter Tunnel has been held by P. & R. since 1872.

● The Kentucky-Elkhorn Coal Co., recently organized at Paintsville, Ky., with a capital stock of $500,000, was reportedly planning development of coal lands in Pike County, Ky., to begin about the first of the year. The operation is expected to produce about 2,000 tons daily, shipping via the Big Sandy branch of the C. & O. Incorporators are Estill W. Smith, Nelson Howard, George Burke and others.

● The new slope operation of the Central Coal Co., controlled by the Cutshin Coal Co., near Monterey, Tenn., reportedly is now producing 500 tons daily, with eventual output scheduled to reach 1,500 tons a day. The Ravencroft seam is being mined and the installation of jigs for coal preparation now is under way.

● The Gibbs Coal Co., Somerset, Pa., is reported to have acquired the Haws No. 1 mine of the Haws Coal Co., Holsopple, Pa. The company is understood to be planning to retimber the mine, lay new track and rebuild the tipple.

● Purchase by The Union Pacific Coal Co. of 160 acres of coal land near Puritan, Colo., for stripping purposes has recently been reported. It also was reported that the Erie Coal Co., Denver, would strip the property under lease from U. P. The Erie company is headed by C. G. Cooley, president, and E. J. Wemlinger, vice president in charge of operations. Overburden on the property is said to be 45 ft. thick.

● The Carbon No. 4 mine, McAlester, Okla., owned by the Lone Star Steel Co. was recently reopened by the Starr Coals, Inc., which has been operating the Carbon No. 5 mine under lease from Lone Star. Production from No. 4 is planned at 500 tons daily, for a total of 2,000 tons from the two operations. Both mines were operated by the government until 1946, when Starr Coals leased No. 5. No. 4 mine had been closed since that time.

● The new Seminole mine of the Northern Illinois Coal Corp. near Lenzburg, Ill., last month was reported ready for commercial production of prepared coal. A stripping operation, the new mine is planned for an eventual capacity of 90,000 tons a month on two shifts.

● First production from the new Green Diamond slope mine of the Mid-Continent Coal Corp. near Marissa, Ill., was reported late in November. First coal was taken from the mine just $5\frac{1}{2}$ months after the ground was broken last June.

●

M. A. Hanna Favors St. Lawrence Seaway

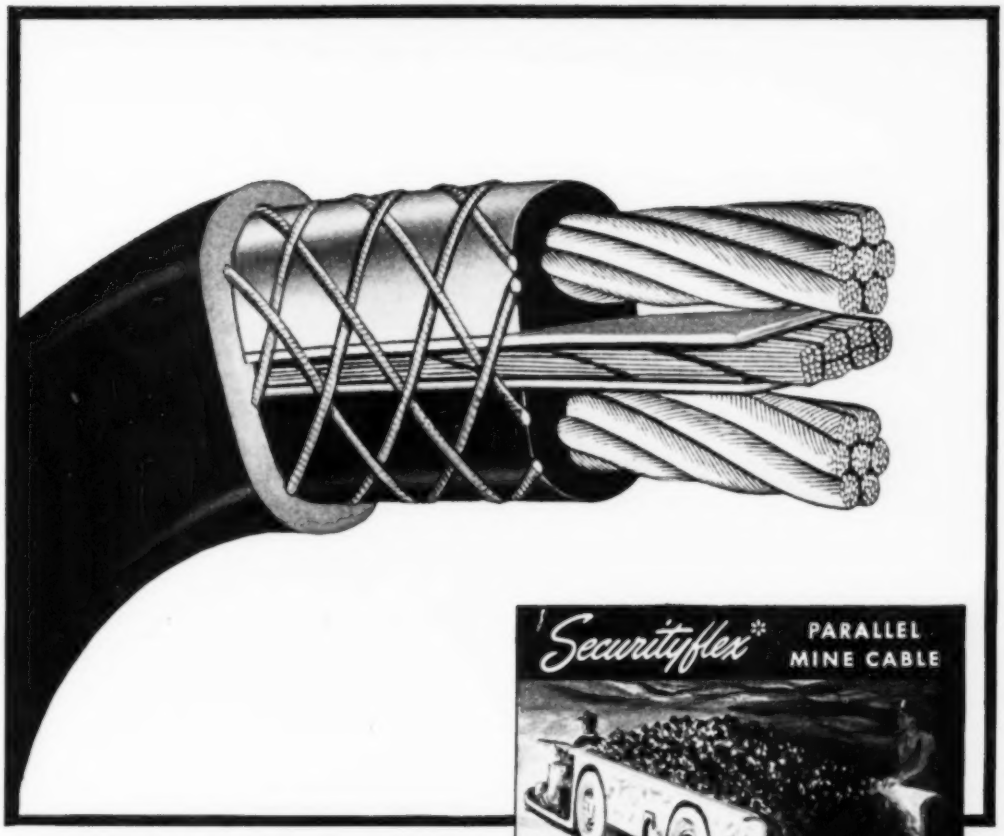
Unexpected support of the St. Lawrence Waterway project was made public late in November with the release of letters written earlier in the month by G. M. Humphrey, president, and R. L. Ireland, vice president, The M. A. Hanna Co., Cleveland. With the reversal of its previous stand, the Hanna company became the first major Great Lakes ore and shipping organization to favor the project, which has been bitterly contested for many years by coal, railroads and other organizations. Several days later, Charles M. White, president, Republic Steel Corp., was quoted as also in favor of the waterway.

In his letter, which was sent to Ohio senators and representatives, Mr. Humphrey said that the change in the company's policy resulted from the discovery of large-scale high-grade iron-ore deposits in Quebec and Labrador, which are currently being developed, and the need for this ore to replace the gradually declining high-grade reserves in this country. Previously, he wrote, it was felt that there was not sufficient tonnage to move over the seaway that would be of benefit to the Midwest, but now it is "most important that our Midwest steel plants and the enormous industry dependent on them have the benefit of having this ore brought to them through the St. Lawrence Seaway to maintain their competitive positions in their present locations."

All but 90 miles of the 1,012 miles from the Gulf of St. Lawrence, to which the Canadian ore would be brought by rail, is navigable by regular standard Lake vessels, Mr. Humphrey pointed out, and the seaway would make this distance also navigable and thus provide water transportation for the entire route. "We still oppose the St. Lawrence proposal solely as a power project, but in view of the multi purposes to be gained as indicated by new developments, we strongly favor the project providing that power development will be limited by economic justification," he said.

Mr. Ireland's letter, which he sent to certain people with whom he had been associated in opposing the project, read as follows:

"The attached copy of a letter written by Mr. George M. Humphrey,



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President of The M. A. Hanna Company, to Senators Taft, Bricker, and other Ohio congressmen speaks for itself.

"When I first opposed the St. Lawrence project, it was before the last war and the ravages that had occurred in Europe. No one expected, as a result of the war, the situation that now prevails which has created an entirely new set of conditions.

"Of first importance to everybody has been the accelerated depletion of the high grade iron ore reserves of this country. The discovery of the high grade iron ore tonnages in the Labrador-Quebec area provides a new source of supply. When the Labrador ore begins to arrive on the shores of the Gulf of St. Lawrence, it is going to move either down the Atlantic Seaboard to existing or new steel plants there, or, if a seaway of sufficient size to handle Great Lakes "Bulk Freighters" permits, it will move to the steel plants of the Great Lakes Basin area to be used to supplement the declining supply of Minnesota ores, thereby protecting our Great Lakes Basin economy.

"As a coal man, my opposition in the past was based upon the three following points:

"1. The importation of competitive fuel.

"2. The loss of coal business resulting from a decline in manufacturing by virtue of competitive manufactured imports.

"3. The loss of potential coal business through the construction of the hydro-electric facilities.

"The danger of coal importation in the light of today's international conditions is negligible.

"The demand for power today far exceeds our most optimistic estimates of a few years ago. With the steam electric program as presently projected offering the coal industry opportunity for substantial expansion, the necessity for protecting a declining market no longer exists.

"The development of such hydro-electric plants in connection with the Seaway, as are economically justifiable, will, in this case, attract large scale industry, which in turn will necessitate further urban and industrial development. This has only recently become apparent to me because of the examples in comparable areas, namely, the developments that have occurred in the proximity of the plants of The Ontario Hydro Commission and the Niagara Hudson Electric Company developments.

"I am, as a matter of principle, as much as ever against government ownership and operation, but with Governor Dewey of New York and the Province of Ontario both favoring the St. Lawrence Hydro-Electric project, I feel we would be doing ourselves more good to support the entire project, and use our influence by urging that the distribution of resulting electric power be placed in the hands of private enterprise."

Preparation Facilities

Colonial Coal Mining Co., Madisonville, Ky.—Contract closed with McNally-Pittsburg Mfg. Co., for one McNally-Norton automatic washer, to handle 400 t.p.h., 5x0-in. raw coal.

Blythe Bros. Co., Mill Creek mine, Anawalt, W. Va.—Contract closed with McNally-Pittsburg Mfg. Co. for complete raw-coal preparation facilities consisting of Morrow standard three-grade screening unit complete with one picking-table loading boom and two McNally-Pittsburg car retarders.

Central Coal Co., New Haven, W. Va.—Contract closed with McNally Pittsburg Mfg. Co. for one McNally-Norton automatic washer to clean 400 t.p.h. of 5x¼-in. raw coal (installation by Mines Engineering Co.).

Key Coal Co., Astoria, Ill.—Contract closed with McNally-Pittsburg Mfg. Co. for complete new tipple and washer; run-of-mine to be broken in McNally-Pittsburg 10x16-ft. rotary-type breaker at rate of 350 t.p.h.; rock and foreign material automatically rejected to rock bin, with 7x0-in. raw coal fed to McNally-Norton automatic rewash jig for retreating the crushed middle-gravity refuse fractions; reclaimed coal from refuse and clean coal from main washer to be classified at 7x3, 3x1½ and 1½x0; the 7x3 and 3½x1½ to be either boom-loaded direct or discharged to mixing conveyor for blending with minus sizes or delivered to crushing circuit for reduction to 1½-in.-minus; normal 1½x0 washed coal to be dewatered at ½ mm.; plant complete with McNally-Pittsburg water-handling and clarification facilities; all loading tracks equipped with McNally-Pittsburg car retarders.

Midland Electric Coal Co., Atkinson mine, Atkinson, Ill.—Contract closed with McNally-Pittsburg Mfg. Co. for complete remodeling of present preparation plant and replacement of present washing facilities; r.o.m. passes existing r.o.m. crusher and goes over revised raw-coal screen with separation at 7 in.; plus 7 in. to be crushed to 7x0, passing over bar screen set at 4 in.; 4x0 raw coal to join 7x0 raw from r.o.m., with plus 4-in.-crushed recirculated over raw-coal circuit; combined 7x0-in. raw coal then fed into two McNally-Norton 6-cell automatic washers; middlings from washers prescreened and crushed for middlings rewashing; washed coals classified at 4, 2, 1¼ and ¾ in.; the 7x4 to be delivered to Track 1 or to mixing conveyor, 4x2 to Track 2 or to mixing conveyor, 1¼x¾ to mixing or transfer conveyor; ¾x0 washed coal to be dewatered at ½ mm.; ¾ x ½ mm. to be delivered alternately to mixing conveyor or domestic bin or to two McNally-Vissac thermal dryers for drying and to Track 5; plus 1¼-in. to be recrushed to 1¼x0 and returned to loading, as desired.

Jewell Ridge Coal Corp., Hazard, Ky.—Contract closed with McNally-Pittsburg Mfg. Co. for three-track raw-coal screening and preparation plant to handle 300 t.p.h. of run-of-mine screened over Morrow standard three-track three-grade screening unit; lump and 5x2 egg loaded over Morrow standard picking-table loading booms; McNally-Pittsburg car retarders on all tracks.

Slab Fork Coal Co., Slab Fork, W. Va.—Contract closed with Jeffrey Mfg. Co. for washing plant; capacity, 150 t.p.h., run-of-mine.

Garmeada Coal Co., Middlesboro, Ky.—Contract closed with Jeffrey Mfg. Co. for coal-handling equipment; capacity, 250 t.p.h., run-of-mine.

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G.E. Official Predicts Return to Coal Use

The return to coal as the nation's chief source of fuel, in the place of petroleum and natural gas, and the ultimate replacement of natural oil by synthetic products, was forecast last month by T. R. Rhea of the General Electric Co., Schenectady. Mr. Rhea said that the swing would be very gradual and might extend over several decades. Even though more heat energy now is obtained from petroleum products than from coal, "such a trend cannot continue because the U. S. does not have unlimited petroleum reserves," he reported. "A gradual swing back to coal-based power means that more of this power will be transmitted as electric power."

The steadily increasing value of petroleum will force major industries to turn back to coal as the basis for electric power, he pointed out.

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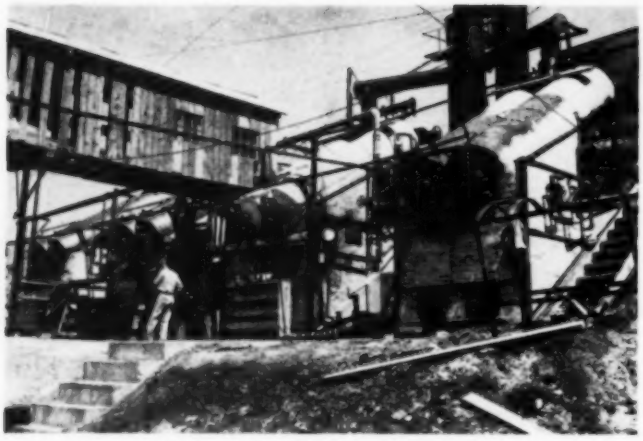
NLRB Issues Decree Against U.M.W.A.

Its first decree against the U.M.W.A. under the provisions of the Taft-Hartley Act was entered early last month by the National Labor Relations Board. The order, to which the union consented to clear up several cases pending against it, required that the union's District 31 and four locals post notices agreeing that they would not "restrain or coerce" employees of three West Virginia coal companies.

The complaint signed by Robert N. Denham, NLRB general counsel, alleged that during the dispute over pensions last spring the union and its members had engaged in mass picketing, in assaults on working miners, in threats to other miners and had shut down by force the mines of the Grafton Coal Co., Coleman & Gray, Inc., and Atlas Engineering Co. The NLRB withdrew its petition for an injunction.



Utah Plant Produces Char From Coal

PARTIAL VIEW of the new coal-processing plant of the Records Coal Processing Corp. at Wellington, Utah, which is now in partial operation and is producing from each ton of coal 1,300-1,400 lb. of char, 4,000 cu. ft. of gas, 75 gal. of ammonia liquor and 40-gal. of tar oil. Each of the four benches shown above have two inclined retorts holding 3 tons of coal, which during the 3½-hour processing period is subjected to steam superheated to 1,000 deg. F. After the gas is drawn off, the char is removed.

The plant is designed to process 100 tons of coal a day but with its present steam-plant facilities can be expanded to a capacity of 500 tons a day. The company is planning the installation of equipment for the production and storage of benzine, toluene and xylene.

Mines Bureau Reports on 1945 Kentucky Explosion

Rock-dusting of the Belva No. 1 mine, Kentucky Straight Creek Coal Mining Co., Fourmile, Ky., probably would have localized the explosion there Dec. 26, 1945, and saved the lives of many of the 25 victims, according to an investigation report released by the U. S. Bureau of Mines. Fires caused by the explosion forced the sealing of the mine and it was not until Aug. 5, 1948, that the seals were removed. The final phase of the Bureau's investigation was conducted simultaneously with final recovery operations ending Oct. 21, 1948, with removal of the last bodies from the mine.

"This disaster," the report says, "was caused by the ignition of an accumulation of methane which in turn ignited coal dust, resulting in the propagation of flame throughout the greater portion of the mine. The accumulation of gas was caused by defective ventilation and unsafe mining practices; the propagation of flame by coal dust over a wide area was caused by failure to rock dust the mine; and the ignition of methane was caused by failure to eliminate sources of open arcs, sparks, and flames from face regions."

Bureau officials directing the investigation and preparing the report were M. J. Ankeny, chief, coal mine inspection branch, M. C. McCall, supervising engineer, Birmingham, Ala., and C. H. Dodge, engineer-in-charge, Jellico, Tenn. They pointed out in the report that the operators of the mine had been warned of dangerous conditions following federal inspections prior to the disaster.

Examination of the area where the explosion began led the investigators to conclude that it was caused either by an electric arc or spark, or by smoking. The report calls the finding of a match stem near the body of a loader "of little significance" because "smoking was a common practice in this mine and matches were used without restriction."

"In this connection," the report says, "the investigators desire to point out that if the loader was attempting to smoke, he was not violating any company rule or state mining law, but on the contrary was a victim of the mining conditions and practices which were allowed to exist in this mine." It adds that "no specific evidence was found that he was smoking or attempting to light a cigarette when the explosion occurred," and it mentions a non-permissible blower fan as the probable source of ignition. This fan was "in such a position that it would recirculate air," the report notes, adding that no examination for gas and other hazards was made before the men entered the mine, although on the last day of operations before the Christmas shutdown, a gas "bleeder" was heard in the working place where the blast originated.

The report notes that the explosion was not violent or highly destructive except in and near the working place where it began, so that the most serious loss, other than that of human life, was "the loss of production from the mine for a period of nearly three years and the loss of the use of a considerable quantity of mine equipment during the same period." Noting that it will be "extremely difficult" to put the mine into condition for safe operation through the present openings, the report says that this is "not because of the damage done to the mine by the explosion, but because of the cost of correcting the unsafe conditions that were allowed to develop during the lifetime of the mine."

Foreign Developments

JOHANNESBURG — The Union government has announced the conditions under which it will grant a license to Anglo-Transvaal Consolidated Investment Co. (as trustee for a company to be formed) to manufacture liquid fuel and oil from coal in South Africa. They provide for the establishment of a plant designed to produce 76,000,000 gal. a year. Unless prevented by circumstances beyond the company's control, the production must begin within four years after issuance of the license and must be at the maximum economic capacity of the plant, but it must not exceed 100,000,000 gal. during any one financial year.

The fuel must be made by a process comprising the generation of synthesis gas from carbon-bearing material and the catalytic conversion of the gas to petrol and petroleum-like hydrocarbons.

Subject to satisfactory progress or the event of unforeseen contingencies affecting national requirements, the Minister of Economic Affairs does not intend granting another license within four years or before the date of production, whichever is the earlier, it was reported.

The government states that the coal for making the fuel and oil is that contained in the deposits in the Vredefort district (not far from Vereeniging). As far as practicable, the whole of the coal in each seam must be used. The conditions include provisions for

a special price adjustment fund and the Ministerial approval of sales agreements, excise duties, and prices.

GUATEMALA CITY—Coal veins have been discovered in the Izabal region of Guatemala, according to an announcement by government officials. Tests both in Guatemala and the United States reportedly have proved it to be high-grade lignite. The government is said to be considering plans for major exploitation.

KARACHI, PAKISTAN—Pakistan government officials are negotiating with British mining consultants for an agreement that would assure expert guidance in the survey and exploitation of that dominion's resources, as well as the design of special boilers suitable for handling Pakistan's low-grade steam coal. The Geological Survey of Pakistan will be the co-ordinating agency if the arrangement goes through.

AUSTRALIA—New South Wales coal mines that are unwilling or unable to toe the current policy line of all-out mechanization will be taken over by the joint Commonwealth-N.S.W. Coal Board, it was recently reported. The Board will spend $52,000,000 on equipment to mechanize the collieries in New South Wales as soon as possible. These mines account for 85 percent of Australia's black-coal production. Average man-day production has dropped from 3.51 long tons in 1938 to less than three long tons.

About $13,000,000 worth of equipment has already been ordered, partly in the United States. As a first step in the program, the use of power drills has been made compulsory throughout the industry.

Prime Minister Joseph B. Chifley announced that prospecting has disclosed new open-cut areas. Only the expansion of open-cut production, which at the end of this year will reach 2,000,000 tons annually, has prevented a complete disorganization of coal supplies. In addition, 6,000,000 tons of brown coal are mined by strip methods in Victoria. Underground miners are violently opposing the expansion of strip mining, but they have stopped fighting underground mechanization.

BUENOS AIRES—The first large shipment of domestic coal from the newly opened Rio Turbio coal fields in southern Argentina has been brought into port in Buenos Aires. The shipment, consisting of 1,600 tons, was hailed with considerable ceremony as it was the first step in a plan to render Argentina considerably more self-supporting in the matter of fuel.

However, the coal is probably the most expensive ever mined for commercial use, as it came from a barren and isolated deposit in the Andes nearly 2,000 miles south of Buenos Aires in the sub-arctic tail section of Argentina. Before shipments, it had to be brought by truck over rough trails 190 miles from the mine to the nearest port of Rio Gallegos on the Atlantic Ocean.

Argentina is having trouble paying in dollars for the 3,000,000 tons of coal it annually imports, and the government is planning to spend $25,000,000 to build a railroad from the Rio Turbio mines, the only known deposits in Argentina, to the ocean port of Santa Cruz.

The Rio Turbio field has seen five galleries opened recently with 700 men at work despite below-freezing temperature and 5 ft. of snow. The veins run from 3 to 6 ft. up to 21 ft. thick. Mining is by hand, but coal cutters are being imported. The quality of the coal is a moot point, authorities disagreeing on its quality. Rio Turbio is reported to have a reserve of some 100 million tons of coal.

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EQUIPMENT APPROVALS

Seven approvals of permissible equipment were issued by the U. S. Bureau of Mines in November, 1948, as follows:

Jeffrey Mfg. Co.—Class 23, Form 5 blower-drive unit; 7½-hp. motor, 230 volts, d.c.; Approval No. 2-637; Nov. 5.

Joy Mfg. Co.—Type U-166-46E belt conveyor; 40-hp. motor, 250 volts, d.c.; Approval No. 2-638; Nov. 8.

Goodman Mfg. Co.—Type 97-C-30 belt conveyor; 25-hp. motor, 440 volts, a.c.; Approval No. 2-639; Nov. 10.

Joy Mfg. Co.—Type U-179-43PE chain conveyor; 20-hp. motor, 250 volts, d.c.; Approval No. 2-640; Nov. 18.

Chicago Pneumatic Tool Co.—"Tramdrill" drilling machine; three 2-hp. and two 1-hp. motors, 250 and 500 volts, d.c.; Approval Nos. 2-641 and 2-641A, respectively; Nov. 18.

Baker-Raulang Co.—Types YA-36 and YA-48 "Trite" utility trucks; battery-operated; 2-hp. motor, 20 volts, d.c.; Approval No. 2-642; Nov. 18.

Goodman Mfg. Co.—Type 97-HC-30 belt conveyor; 20/40-hp. motor, 230 volts, d.c.; Approval No. 2-643; Nov. 23.

Coal Publications

Methods of Producing Ultra-Clean Coal for Electrode Carbon in Germany, by H. G. Graham and L. D. Schmidt. U. S. Bureau of Mines, I.C. 7481. 8x10½-in.; paper; mimeo. Free, Publications Section, 4800 Forbes St., Pittsburgh 13. Another in the series of Bureau publications on German methods of mining, preparation and utilization of coal. This paper describes methods of producing extremely low-ash coal.

Analyses of Complex Mixtures of Gas, by S. H. Ash and E. W. Felegy. U. S. Bureau of Mines, Bulletin 471. 75c., Supt. of Documents, Government Printing Office, Washington 25, D.C. Using analyses of mine-air samples on an "air-free" basis, a method is devised for determining quickly, by formulas or graphs, whether a gas mixture is explosive, whether adding air will render it explosive and how it can be made nonexplosive by admixture of inert gases.

Estimated Cost of Producing Heavy Fuel Oil by Hydrogenation of Coal, by L. L. Hirst, L. C. Skinner, E. A. Clarke, R. W. Dougherty and H. D. Levene. U. S. Bureau of Mines, R. I. 4413. 8x10½-in.; paper; mimeo. Free, Publications Section, 4800 Forbes St., Pittsburgh 13. Details of capital and operating costs indicate that, with uncertainties about heavy fuel-oil supplies, it would be economically feasible to produce synthetic fuel oil by coal hydrogenation in some localities even now and that, if the price of petroleum residuum continues to rise, synthetic fuel oil may become attractive in other areas as well.

The Economics of Coal Strip Mining, by H. D. Graham. Bulletin 66, University of Illinois, Urbana, Ill. 77 pp. 6x9-in.; paper. Although stripping makes the land unfit for row cropping, there are other uses for the land in grazing, timber, boating, fishing, trapping, vineyards and pulpwood. If spoil banks in general are made productive, strip mining may be able to offset public disfavor and society may well gain from a better utilization of natural resources.

Tentative Standard Procedure for Testing and Evaluating Bituminous Stoker Coal. $1. Stoker Manufacturers Assn., 307 N. Michigan Ave., Chicago, Ill.; or Bituminous Coal Research, Inc., 912 Oliver Bldg., Pittsburgh 22, Pa. Two years' study and negotiation by members of the joint sponsoring organizations have produced these standards for test equipment and methods for conducting and reporting investigations of coal for use in bituminous underfeed stokers of residential sizes.

Coal Reserves of Canada, by B. R. MacKay: Reprint of Chap. 1 and Appendix A of the Royal Commission on Coal. Edmond Cloutier, King's Printer and Controller of Stationery, Ottawa. 113 pp. 6½x9¾-in.; paper. Classification of various Canadian coals, estimates of reserves in provincial fields and estimates of world supply with reference to the needs of Canadian markets. Fourteen maps.

Pulverized Fuel Conference Report. Institute of Fuels, 18 Devonshire St., London, W 1, England. 42 shillings ($8.40). Sixty papers covering preparation, characteristics and utilization of pulverized fuel.

New Offices for West Kentucky Coal

MOVING OF THE GENERAL OFFICES of the West Kentucky Coal Co. from Earlington to this modern building in Madisonville, Ky., was completed late in the summer. Convenience of a location more central to the company's operations was one of the advantages of the move, in addition to the latest up-to-date office facilities available. The large wing at the right is an entirely new structure added to the former private residence at the left, which was remodeled to the company's requirements. At night, the exterior of the whole building is illuminated by indirect lighting.

B.C.R. Sets Large Budget For 1949 Coal Research

A research budget of more than half a million dollars for the second consecutive year was authorized Dec. 2 by the board of directors of Bituminous Coal Research, Inc., Pittsburgh, Pa., in approving the 1949 bituminous-coal research program directed at creating new coal markets and holding and expanding present markets.

The 1949 budget of $515,800 will finance the development of new equipment, methods for more efficient coal utilization, and fundamental research. The funds for the B.C.R. industry-wide research are provided by 340 coal companies, railroads, and manufacturers. The 1949 budget is exclusive of the programs being conducted by the B.C.R. Mining Development and Locomotive Development committees and does not include substantial sums made available by co-sponsors on certain projects of the general research program.

The work proposed for the current year is for the most part a continuation of the 1948 program. Attention will be given to further development and commercial introduction of residential heating equipment, new methods of industrial coal utilization and improved performance of steam locomotives. Several new projects will be undertaken in 1949, including work on cinder collectors for small plants and locomotive fuel studies. B.C.R., in co-operation with Battelle Memorial Institute and others, will initiate a program on improved gas producers. Co-operative research will be conducted with other solid-fuel associations and groups of manufacturers.

Support has been continued to B.C.R.-sponsored fundamental research in coal gasification, combustion and hydrogenation at the Coal Research Laboratory of Carnegie Institute of Technology and at M.I.T., as well as studies of mine drainage at the U.S. Bureau of Mines and West Virginia University. B.C.R.'s support of cooperative house-planning research at the University of Illinois, a project directed to greater satisfaction from the use of coal by residential consumers, will be continued.

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Coal Group Endows Gob-Fire Study

Establishment by the Western Pennsylvania Coal Operators' Association of a research fellowship at the Mellon Institute of Industrial Research, University of Pittsburgh, for the scientific study of the causes, prevention and control of coal-refuse fires, was announced last month by Dr. E. R. Weidlein, institute director.

Dr. William L. Nelson, who will head the fellowship, which was scheduled to start early in January, will investigate the reactions of coal and inorganic sulfides, especially at low temperatures, and will study all factors in the spontaneous combustion of coal waste, particularly where heaped or piled. In this work, he will have the advisory guidance of Dr. George D. Beal, assistant director, Mellon Institute, and of a technical committee consisting of: Charles B. Baton, Greensburg-Connellsville Coal & Coke Co.; Henry F. Hebley, Pittsburgh-Consolidation Coal Co.; J. B. Morrow, Pittsburgh Coal Co.; and Harry A. Sutter, executive vice president of the donor association.

Coal and Business Activity

		1948 to This Date	1948 Over 1947, to Date
Est. anthracite prod., wk. ending Dec. 11	946,000	54,214,000	—0.9%
Est. bituminous prod., wk. ending Dec. 11	11,900,000	556,780,000	—5.7%

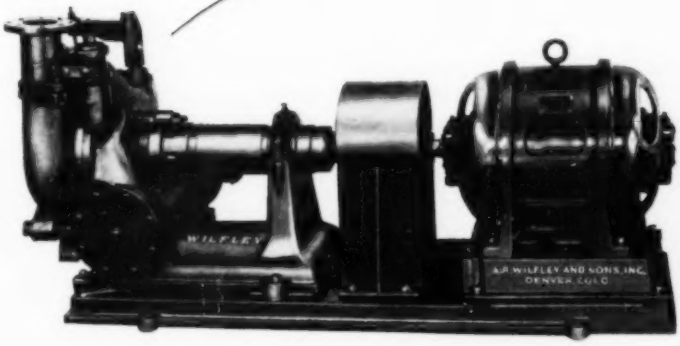
Source: U. S. Bureau of Mines.

	Bituminous Coal Stocks (Thousands, net tons)				Consumption (Thousands, net tons)		
	Nov. 1, 1948	Day's Supply	Oct. 1, 1948	Nov. 1, 1947	Oct., 1948	Sept., 1948	Oct., 1947
Electric power utilities	23,875	85	22,751	16,772	8,689	8,272	8,121
Byproduct coke ovens	11,348	41	10,968	7,310	8,500	8,199	8,278
Beehive coke ovens	†	†	†	†	969	922	965
Steel and rolling mills	1,066	4‡	1,152	1,076	766	697	826
Cement mills	1,612	53	1,369	1,049	949	679	704
Other industrials	19,030	49	19,619	15,632	11,995	10,148	12,604
Railroads (Class I)	9,099	36	8,815	6,305	7,851	7,258	9,048
Retail dealers	2,924	12	2,918	2,132	7,375‡	6,156‡	7,754‡
Total	68,954	45	67,592	50,276	47,094	42,331	48,300

Source: U. S. Bureau of Mines. †Not available. ‡Retail dealer deliveries.

	Latest Week*	Month Ago	Year Ago
Business Week Index of Business Activity, wk. ending Dec. 11	199.4	197.4	197.0
Steel ingot operations (% of capacity)	100.0	99.0	97.8
Electric power output (million kw.-hr.)	5,705	5,571	5,327
Crude oil production (daily avg., 1,000 bbl.)	5,520	5,626	5,253
Misc. & L.C.L. carloadings (daily avg., 1,000 cars)	81	90	88
All other carloadings (daily avg., 1,000 cars)	53	64	58
Prices, spot commodity index (Moody's, Dec. 31, 1931 = 100)	394.4	398.8	455.9
Prices, industrial raw materials (B.L.S., Aug., 1939 = 100)	279.5	279.7	292.5
Prices, domestic farm products (B.L.S., Aug., 1939 = 100)	314.1	317.6	412.6
Prices, finished steel composite (*Steel*, ton)	$95.50	$95.05	$76.09
90 stocks, price index (Standard & Poor's Corp.)	121.1	120.6	119.3

*Date of latest week for each series on request.



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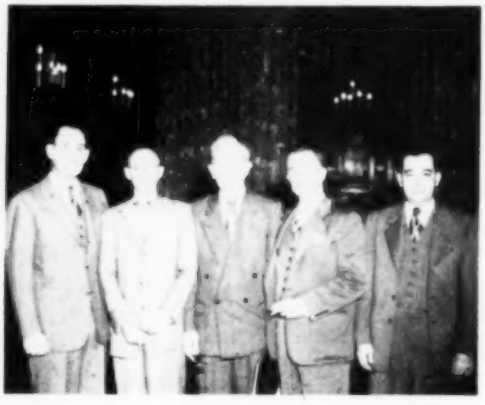
OPENING SESSION—J. M. Lowe, (left), Hillman Coal & Coke Co., secretary-treasurer; Charles O'Neill, president, United Eastern Coal Sales Co., lead-off speaker; and C. M. Donahue, Mine Safety Appliance Co., retiring institute president.

BANQUET PRINCIPALS—G. A. Shoemaker (left), president, Pittsburgh Coal Co., toastmaster; and Harry Moses, president, H. C. Frick Coke Co., speaker. An overflow crowd of 750 members and their guests attended the banquet.

MINING METHODS SESSION—T. G. Ferguson (left), division superintendent, Pittsburgh Coal Co.; J. L. Hamilton, Republic Steel Corp., institute vice president; and Paul T. Porter, chief engineer, Lorain Coal & Dock Co.



SAFETY SPEAKERS—Mr. Shoemaker (left), presiding; E. R. Maize, National Coal Association; C. F. Davis; U.M.W.A.; R. G. Warncke, U. S. Bureau of Mines; and Dennis J. Keenan, Pennsylvania Department of Mines, new institute vice president.

C. M. I. A. Surveys Industry Problems

OVER 750 MEMBERS and guests attending the 62nd annual meeting of the Coal Mining Institute of America, Pittsburgh, Pa., Dec. 9 and 10, were given advance warning of a coming union demand for a six-hour day and were urged to prepare for problems arising out of a slack-off in demand for coal. In addition, the program included a report on a continuous mining machine and other technical advances, a panel discussion on vocational training for coal mining and a series of three papers on safety in the United States and Japan.

J. L. Hamilton, manager, northern coal mines, Republic Steel Corp., Uniontown, Pa., was elected new president of the institute succeeding C. M. Donahue, manager, mining department, Mine Safety Appliances Co. Other officers were elected as follows: vice presidents—M. L. Coulter, New York Central R. R. Co., Indiana, Pa.; G. A. Shoemaker, president, Pittsburgh Coal Co., Library, Pa.; and Dennis J. Keenan, Pennsylvania Department of Mines, Barnesboro, Pa.; secretary-treasurer—J. M. Lowe, Hillman Coal & Coke Co., Pittsburgh; managing directors—G. W. Grove, U. S. Bureau of Mines, Pittsburgh; J. J. Snure, Rochester & Pittsburgh Coal Co., Indiana, Pa.; T. P. Latta, Crucible Steel Corp. of America, Crucible, Pa.; G. H. Sambrook, H. C. Frick Coke Co., Pittsburgh; and J. A. Brookes, Mather Collieries Co., Mather, Pa.

The U.M.W.A. can be expected to push demands for a six-hour day without loss of pay at the next wage conference, warned Charles O'Neill, president, United Eastern Coal Sales Corp., New York, whose address followed the welcoming remarks of Mr. Donahue, presiding at the opening session Thursday morning.

Reviewing the history of past labor disputes in the industry, the evolution of wage agreements, organizational drives by the union, federal legislation and executive intervention, Mr. O'Neill commented on problems now facing the industry and suggested ways to improve the operators' bargaining position.

Complicated by a long period of disruption and strife between the operators and the union prior to 1933 and

TRAINING PANEL—R. B. Hewes (left), director of supervisory training; Harold Davis, assistant supervisor; and J. W. Hunt, supervisor—all of the Mineral Extension Services, Penn State College; M. D. Cooper, director of vocational training, National Coal Association, moderator; M. L. Coulter, Clearfield Bituminous Coal Corp., institute vice president; D. C. Jones, director, Mineral Extension Services; R. W. Beamer, Rochester & Pittsburgh Coal Co.; and G. R. Spindler, West Virginia University.

by divisions among the operators themselves, union-operator relations were made even more complex by the Wagner Act, the Wage-and-Hours Act and the Taft-Hartley Act, and by frequent government intervention, typified in the industry-wide Ickes-Lewis agreement on portal-to-portal pay and the similar Krug-Lewis agreement setting up the Federal Mine Safety Code and the health-and-welfare fund, Mr. O'Neill declared.

The results of these moves have been new strength and prestige for the union and a top-rank wage scale for miners. On the operators' side, however, poor public opinion growing out of earlier and more recent upheavals has made it easier for union leaders to win their demands, and labor legislation has created new problems and situations whose full effects, though not yet completely realized, may well become critical when real competition returns to the industry, he contended.

The most pressing of these problems, Mr. O'Neill continued, may be felt in a price war with the return of a buyers' market. The miners' high wage scale, along with other increasing production costs, has turned many operators to stripping as a low-cost mining method, with the result that there now are three general cost levels in the industry's operating methods: non-mechanized deep mining, mechanized deep mining and strip mining. In this situation is the making of disastrous price competition if coal demand slumps, he pointed out. Anticipating this situation, Mr. Lewis recently threatened that the union would "equalize work opportunity" among miners, Mr. O'Neill reminded his hearers. This may become a lively question at the next wage conference.

Union leaders also are serious about demanding a six-hour day without loss of pay, Mr. O'Neill declared. To meet this demand and others, the operators must anticipate the union's demands realistically, make up their minds that the union is here to stay, choose their negotiators with care and take further steps to achieve unanimity among themselves. Operators, he contended, should give full authority to their negotiators to make commitments without interference from the sidelines, and industry representatives should come to the wage conference with the intention of writing a contract, not with the intention of "busting" the union or getting special favors for special groups.

There is little to be gained by arguing the merits of industry-wide bargaining, Mr. O'Neill said. It does not matter whether contracts are local, district, regional or national in scope; the really important thing is the willingness and ability of the union to enforce and abide by a contract once agreement is reached.

Turning to safety, Mr. O'Neill cited the operators' share in improving safety but declared that their failure to publicize their accomplishments has given the union a powerful instrument for shaping public opinion and creating sympathy for the so-called plight of the coal miner. Operators probably have spent more money and made more progress in safety than any other industrial group. The time now is ripe for more training in safety for miners and for more cooperation among mine management, workers and the union, he concluded.

Nine months' experience with an experimental model of a continuous mining machine was reviewed by T. G. Ferguson, division superintendent, Pittsburgh Coal Co., Renton, Pa., at the Thursday afternoon meeting, Mr. Hamilton presiding. Working in the Pittsburgh seam in an area where it is 84 in. thick, with 12 in. of drawslate overlying the coal, the mining machine was put into a single entry that already had been driven 600 ft. by hand loading. The mining machine drove the entry another 600 ft., opening an area for driving 150- to 300-ft. rooms into the solid. Rooms were driven 13 to 14 ft. wide on 25-ft. centers and ribs were retreated immediately upon completion of each room. The machine took 72 in. of coal, leaving 12 in. at the top to support the roof, and timbers were placed every 4 ft. and kept in advance of the operator.

Two battery-driven shuttle cars served the mining machine, one remaining with the machine constantly as a bin and the other moving between the bin and loading ramps, Mr. Ferguson explained. A remote-control locomotive, operated by the shuttle-car driver, moved mine cars as needed. Water for the mining machine

(*Continued on page 132*)

COAL AGE was founded in 1911 by the Hill Publishing Co. In 1915 COLLIERY ENGINEER, with which MINES AND MINERALS previously had been consolidated, was absorbed by COAL AGE.

When, in 1917, the Hill Publishing Co. and the McGraw Publishing Co. were consolidated to form the present McGraw-Hill Publishing Co., Inc., COAL AGE became a member of this larger publishing enterprise. On July 1, 1927, the journal was changed from a weekly to a monthly.

During 38 years the editorship has been held successively by Floyd W. Parsons, R. Dawson Hall, C. E. Lesher, John M. Carmody, Sydney A. Hale and Ivan A. Given. The editorial staff of COAL AGE consists of: Ivan A. Given, J. H. Edwards, William H. McNeal and W. A. Stanbury Jr.

PARTICIPANTS IN THE OPENING SESSION of the West Virginia Coal Mining Institute—Robert H. Morris (left), vice president and general manager, Gauley Mountain Coal Co., Ansted, and retiring institute president; Charles T. Holland, head, mining department, Virginia Polytechnic Institute, Blacksburg; Jesse Redyard, general manager, Redyard Coal Co., Pineville, and new institute president; W. E. E. Koepler, secretary, Pocahontas Operators' Association, Bluefield; and James H. Cunningham, B.C.I., Washington, D. C.

AT THE AFTERNOON SESSION—Curran Cavanagh (left), vice president, Fairmont Supply Co., Fairmont; Harold B. Wickey, general superintendent, northern mines, Consolidation Coal Co. (W. Va.), Fairmont; W. A. Staab, Calcium Chloride Association, Morgantown; Gerald von Stroh, director, Mining Development Committee, Bituminous Coal Research, Inc., Philadelphia; Martin A. Elliott, assistant chief, research and development, U. S. Bureau of Mines, Washington, D. C.; and Truman E. Johnson, secretary, Northern West Virginia Coal Operators' Association, Fairmont.

Varied Program Marks 41st W. Va. Meet

ATOMIC POWER, diesels underground and continuous mining were among the subjects at the 41st annual meeting of the West Virginia Coal Mining Institute, held at the Morgan Hotel, Morgantown, W. Va., Nov. 19. Jesse Redyard, general manager, Redyard Coal Co., Pineville, was elected president for 1949. R. H. Morris, retiring president of the institute and vice president and general manager of the Gauley Mountain Coal Co., Ansted, was general chairman of the meeting. Session chairmen were Mr. Redyard and W. A. Staab, mining engineer, Calcium Chloride Association, Morgantown.

Chairmen of the program and arrangements committees for the meeting were Harold B. Wickey, general superintendent, northern mines, Fairmont Division, Consolidation Coal Co. (W. Va.), and Curran Cavanagh, vice president Fairmont Supply Co. Truman E. Johnson, secretary, Northern West Virginia Coal Operators' Association, was toastmaster at the luncheon, at which the speaker was Dudley S. DeGroot, head football coach, West Virginia University. Dr. C. E. Lawall, assistant to the vice president, C. & O. Ry. Co., served as toastmaster at the banquet and the speaker was Holmes Alexander, senior staff editor of Kiplinger's Magazine.

James H. Cunningham, Bituminous Coal Institute, Washington, D. C., in his paper, "Is Cheap Atomic Power Coming Soon?" drew the following conclusions by answering (1) "Assuredly no," (2) "Probably not" and (3) "Probably yes" to three questions: (1) "Can atomic power compete today?"; (2) "Will atomic power compete within a few years?" and (3) "Will the time ever come when atomic energy can compete with present fuels?" He cited illustrations showing the many years that usually elapse between a demonstration and widespread use of a new invention or method and said the world's supply of uranium will be exhausted long before coal.

Although the Bureau of Mines has been investigating the diesel engine for underground use since 1938 and has outlined a permissible schedule for the equipment and conditions under which it can be operated, no diesel

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Secretary-Treasurer—G. R. Spindler, director, School of Mines, West Virginia University, Morgantown.

locomotives, said Martin A. Elliott, assistant chief, Research & Development Branch, are in use underground in this country. The hazards investigated were those of health, explosion and fuel handling.

Internal characteristics of the diesel favor obtaining the complete combustion necessary to hold carbon monoxide within permissible limitations. Smoke concentration is a sure indication that the engine is operating beyond its range and not giving complete combustion. Maintenance is highly important because leaky injection valves can increase CO. Experience with diesels in driving the Delaware aqueduct highlighted the importance of maintenance and indicated that the outage for repairs of a permissible installation will be perhaps 20 percent. Diesels adjusted to operate within their range at low altitudes must have the fuel injection stops changed at high altitudes; otherwise, CO will increase. With proper adjustment and maintenance, a unit needs a ventilation of about 25 times the displacement at maximum speed to dilute the CO in the atmosphere to harmless proportions.

Practical scrubbers can be built onto the unit to remove the aldehydes, which cause objectionable odors from the exhaust gases. In England, the exhaust gases are water-cooled before passing out through the flame arrester. Most European units have exhaust scrubbers. Sulphur content of the fuel oil should be under 0.3 to 0.4 percent if a diesel is to be used under the usual conditions of mine ventilation.

Continuous mining, the subject of a paper by Gerald von Stroh, director, Mining Development Committee, Bituminous Coal Research, Philadelphia, was defined by Mr. von Stroh as an uninterrupted flow of coal from the face to the tipple. In addition to a combination mining-and-loading machine it must include improvements in face conveying, timbering, ventilation and dust control. On the machines proper, some 300 patents have

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been taken out and back in 1870 a compressed-air-driven unit was given a trial. Development on the McKinlay loader, which cuts and loads 5 tons per minute and advances at twice the speed the entry can be serviced, was begun in 1900 and some of the machines that went into use in 1920 are still in service. The recently announced Colmol operates on much the same principle as the McKinlay. Among the other combination mining-and-loading machines that went into use in the early 'twenties was the Jeffrey entry driver. Then, for 20 years, interest in continuous machines lapsed until it was revived about five years ago.

Since the industry program was started (about Sept. 1, 1948), Mr. von Stroh said, he has visited many coal mines and has reviewed all the patents. He explained that at the beginning he knew nothing about coal mining and that the committee purposely selected such a man to direct the program. At present, a review is being made of the conditions at subscribers' mines to which the continuous mining machine must be adapted.

Home rule is a prime essential for a successful vocational program that will endure, cautioned W. E. E. Koepler, secretary, Pocahontas Operators' Association, Bluefield, in a paper on vocational education. A National Youth Administration expenditure in 1942 for a shop and equipment in the Pocahontas coal field, to teach munitions trades, for a time took away the supply of young men but awoke the coal operators to the possibilities of training young men for mining.

The original equipment was turned into a vocational school and now three other vocational schools, including one for Negroes, are functioning in the district. The Negro population thus far has shown the greatest interest in the expansion of the program, if pressure from their leaders is a true indication. Great difficulty is experienced in getting competent Negro teachers for the Negro school. White teachers cannot be employed in that school because of a constitutional provision.

Mr. Koepler said the employers must provide greater support for the vocational program, should supply broken-down and worn machinery of all kinds on which the boys can work and should induce experienced operating men to lecture in the school on subjects with which they are most familiar.

Bad effects of oxidation of shale mine roof of the Pittsburgh seam were clearly indicated by a photograph of test specimens shown by Charles T. Holland, head, Mining Department, Virginia Polytechnic Institute, Blacksburg, Va., in connection with his paper dealing with the structure of mine roofs. Seven core specimens kept several months in helium showed little or no change, while a similar number from the same strata kept the same length of time in oxygen showed

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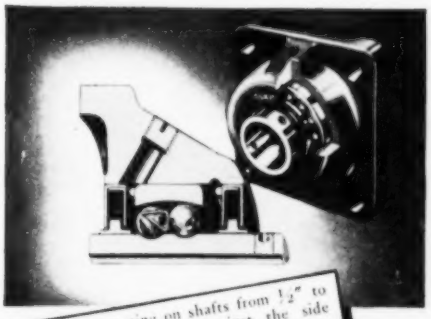

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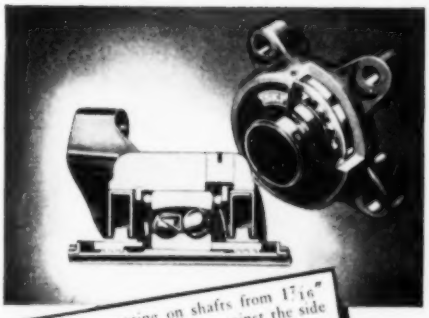

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considerable swelling, cracking and flaking. Another set kept in carbon dioxide showed little or no deterioration. Oxidation may increase stress and decrease strength of roof and some oxidation can come from mine water, he stated.

Because he found so many joint planes in mine roofs, Prof. Holland believes that there are not many beams in mine roofs but instead many flat arches. He showed slides of numerous types of mine roofs, principally from West Virginia and consisting mostly of those bared by strip mining. From their study, he declared that wide and extreme variations show that one cannot depend on any characteristic to prevail very far in any mine. Where the roof strata are bedded at an angle to the coal instead of parallel, and thus pinch out, roof is sure to be bad.

From 52 specimens from 14 roof beds, he has analysis data showing percentages of carbon dioxide, silica, pyritic sulphur and aluminum oxide, as well as ignition losses, but has not yet been able to coordinate that data with control of mine roof. During the discussion in answering a question put to him because he has made a study of plastic roof-protective coatings, Prof. Holland stated that in general they have not been successful. Even freshly-cut blocks coated immediately in the laboratory deteriorated under the coatings.

Operational movies of the Meco-Moore cutting-and-loading machine and of the coal plow, both working in Europe on long faces, were shown by G. R. Spindler, director, School of Mines, West Virginia University. In briefing his paper, "Present Status of the Coal Mining Industry in European Countries," he showed a number of slides and covered about the same ground as at the White Sulphur Springs meeting (*Coal Age*, December, 1948, p. 128). He stated that many of the iron furnaces of Europe are not in use, because of a shortage of coking coal rather than a shortage of iron ore.

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Coal Mining Institute

(Continued from page 125)

was provided from a tank and delivered at a 100-lb. pressure for spraying. The full crew for the machine consisted of a foreman, a machine operator, a shuttle-car operator and two timbermen on the operating shift, supplemented on the off-shift by one utility man to charge batteries, rock-dust, grease, change bits and unload supplies.

Listing effects of the machine on operation, Mr. Ferguson stressed the following: (1) elimination of cutting, drilling and shooting; (2) reduction of active working places to one, though it would be possible to use two or more machines in two or more places; (3) smaller crew and less

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equipment and maintenance; (4) the necessity for continuous operation, in view of the high capital cost of the machine; (5) greater recovery of marginal-cost coal; (6) complex transportation problems growing out of the rapid rate of advance; (7) necessity for full power at the face, since low power stalls the machine rather than simply slowing it down; (8) scheduling of one idle shift in 24 hours for maintenance and repair; (9) simplification of ventilation, since there are fewer working places to ventilate and the machine itself offers opportunities for positive control of air; and (10) elimination of water problems because of rapid advance.

Summarizing safety features made possible by the machine, Mr. Ferguson cited the following: (1) simplified and concentrated supervision because there are fewer working places; (2) fewer men required to mine equivalent tonnage; (3) fewer working areas to ventilate and therefore better ventilation; (4) less danger from roof falls because workers move on to new areas before roof has time to sag; (5) snug-fitting timbers resulting from smooth roof cutting; (6) no blasting; (7) opportunity to concentrate fire-fighting equipment; and (8) less kicking and swinging because of the 17-ton weight of the machine, its only movement being ahead of the operator.

Operating characteristics of the machine, said Mr. Ferguson, include the following: good recovery, easy maneuverability with 90-deg. swings possible, some reduction in coarse-coal output and a total connected horsepower of 149, though all available power is seldom used at once.

Stressing the fact that the mining machine described was an experimental design and that many improvements have been made in the production model soon to be unveiled (p. 90, this issue), Mr. Ferguson stated that, based on 65 percent operating time, the experimental machine produced 300 tons per day. "It is a big step forward in developing a simpler and cheaper way of producing coal," he concluded.

Use of a 48-in. core-drilled shaft for ventilation and an escapeway was described by Paul T. Porter, chief engineer, Lorain Coal & Dock Co., Blaine, Ohio. Extension of the working area to a distance of 3½ miles from the portal necessitated an additional escapeway closer to the working faces, he pointed out. First thought was to build a new portal but the costs of portal construction, even when offset by possible savings growing out of reduced travel time, appeared more formidable than the cost of a 48-in. core-drilled shaft, which could be built for only one-eighth to one-tenth as much as a new portal.

Sinking of the shaft, as described by Mr. Porter and as performed by the Pennsylvania Drilling Co., Pittsburgh, involved core-drilling with shot as a cutting medium, with the drill mounted level and centered above the

proposed shaft; removing unconsolidated materials down to bedrock by manpower; and centering a steel shell in this space and filling the annular space outside with concrete up to the surface. Cave-ins and water springs were handled by special methods developed by the contractor and, as drilling into the rock proceeded, core segments were lifted out by a special mechanism. Total depth of the shaft is 202 ft. The smooth-cut rock made it unnecessary to seal the drilled part of the shaft. Water was grouted off and several weak fireclay beds were sealed off.

Two entries leading to the new shaft were finished before drilling was completed, total distance from the main haulage entries to the new shaft being 600 ft., Mr. Poreter explained. In normal operation, the shaft will be used as an exhaust for part of the ventilation system but since it was drilled primarily as an escapeway, the exhaust air can be directed away from the manway entry by an airlock. Inside the airlock is a device which permits men to close either of the two doors or both without exposure to gases, smoke or foul air.

In addition to the two escapement entries leading to the new shaft, a third entry is being driven on the right side of the main haulageway entries, Mr. Porter pointed out. This third entry is to be used as a neutral manway escapement, with entrances every 300 ft. It is connected to the airlock by incombustible overcasts and it is believed that nearly all workers could travel it to the new shaft.

Shaft facilities include a circular steel-casing bullet-shaped cage connected to a fixed derrick and hoist rigging powered by a gasoline engine, Mr. Porter said. Men are completely enclosed when the cage is raised or lowered. An emergency fan, directly connected to the hoist motor shaft, can produce 10,000 c.f.m. through an 18-in. steel tube in the shaft and operates automatically as long as the cage is in motion. The cage will accommodate 6 to 8 men.

Of the total of 84,000 c.f.m. produced by the main fan, 50,400 is exhausted through the new shaft by a natural split of the total ventilating current, Mr. Porter explained. Comparing former air quantities of 71,888 c.f.m. 400 ft. from the main fan with present quantities, he reported that the new shaft has increased air at that spot to 82,400 c.f.m. Two miles from the main fan, air was increased from 52,125 to 70,090 c.f.m. Similar increases were recorded elsewhere at greater distances from the main fan.

Summarizing benefits derived from the core-drilled shaft, Mr. Porter cited its availability as an emergency escapeway, improvement in mine ventilation, low cost compared to building a new portal and the possibility of providing similar escapeways close to new working areas as mining advances.

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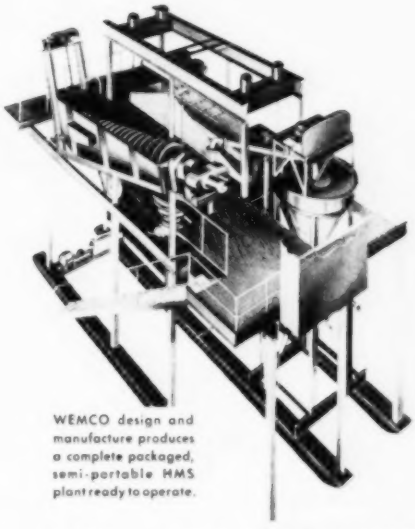

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tuminous industry in 1948 was predicted by Harry Moses, president, H. C. Frick Coke Co., Pittsburgh, at the banquet Thursday evening. Mr. Donahue, retiring president of the institute, presided and Mr. Shoemaker was toastmaster.

Citing the vitality of the bituminous industry, evidenced in its ability to turn out big tonnages in spite of upheavals, Mr. Moses urged coal producers to continue mining an abundant supply of high-quality coal at a reasonable price as their main insurance against loss of customers to competing fuels. He summarized basic changes that have come to the industry in recent years, including portal-to-portal pay, lunch-time pay, the welfare-and-retirement fund, the Federal Mine Safety Code and the industry-wide contract, along with an increase of 288 percent in miner payrolls since 1939, and warned that there never will be a return to "the good old days" in the lifetime of most operators now producing coal.

The great burden of creating favorable costs and maintaining high quality rests on the coal producers, Mr. Moses declared. The big needs of the industry, he pointed out, are large capital investments in new machinery, plants and processes; tax revisions that will permit capital investment and research expenditures; a ban on government intervention aimed at restricting output; and a solution of the industry's two most pressing internal problems: safety and labor relations.

The industry has made good progress in safety but still not enough, Mr. Moses contended, and he warned operators to expect extension of the Federal Mine Safety Code and enlargement of the responsibilities of federal mine inspectors. In labor relations, some way must be found to restore mutual confidence between operators and the union. On both sides, there is intelligent, honest and fearless leadership that must be brought forward to end the industry's internal strife, he concluded.

The Friday morning session, with Mr. Coulter presiding and M. D. Cooper, director of vocational training, National Coal Association, as moderator, was given over to a panel discussion of vocational education for coal mining. The following speakers participated: D. C. Jones, director; J. W. Hunt, supervisor of mining extension; Harold Davis, assistant supervisor of mining extension; and R. B. Hewes, director of supervisory training—all of the Mineral Extension Services, Pennsylvania State College; J. D. Reilly, vice president (operations), Hanna Coal Co., St. Clairsville, Ohio; R. W. Beamer, training supervisor, Rochester & Pittsburgh Coal Co., Indiana, Pa.; G. R. Spindler, director, School of Mines, West Virginia University, Morgantown, W. Va.; and E. A. Holbrook, dean emeritus, Schools of Mining and Engineering, University of Pittsburgh.

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up substantial training programs, the bituminous industry as a whole has lagged behind the times in training its personnel, Mr. Jones stated. Labeling as unsatisfactory, inefficient and costly the old training method whereby a new employee was expected to learn simply by working with an experienced man, Mr. Jones urged a far-reaching plan to train management, supervisory, maintenance and production employees. For supervisors, he suggested courses offered by state mining departments and state universities and colleges, leading to certification and providing in addition an over-all view of mining administration and economics. These courses can be supplemented by on-the-job training set up by local mine officials with the help of state agencies. For maintenance men, Mr. Jones urged training classes sponsored and conducted by company personnel and shaped along lines recommended by state agencies. For production workers, he proposed apprentice training under a company-backed instructor skilled in machine operation. The three fundamentals of a good training program are competent instructors, follow-up after instruction and refresher work to keep abreast of new developments, Mr. Jones concluded.

Summarizing the history of technical-vocational training in Pennsylvania, Mr. Hunt described classroom and correspondence courses set up especially for such production employees as shotfirers, machine operators, face and section bosses, ventilation engineers and surveyors. These courses, he explained, are less technical than those for supervisors and less manipulative than those for machinists and are aimed primarily at practical mine operation, with only secondary attention to certification aims. With instructors drawn from among experienced company personnel and certified as such by state authorities, these courses include English, physics, algebra, lighting, ventilation, mine fires and explosions, surveying and mapping, rockdusting, timbering, haulage, etc. They represent cooperative efforts by company and union officials, the state department of public instruction and the Mineral Extension Services, he said.

New developments in mining machinery and methods necessitate refresher training for experienced employees in mathematics, electricity and magnetism, power transmission, motors, controllers, blueprint reading, permissibility, etc., Mr. Davis contended. Such a course adds up to about 150 hours of combined shop and classroom work, without, however, over-emphasis on shop work. New information is best given first in the classroom, followed by shop instruction using equipment that is scheduled for repair or overhauled equipment that is on its way back to the mine. The goal of such training, Mr. Hunt pointed out, is better preventive maintenance.

Training needs of supervisors are

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varied and wide and are best served by round-table panel discussions led by specially-trained conference leaders, said Mr. Hewes, who has just directed this new division of the Mineral Extension Services through its first year. Ordinary question-and-answer and lecture methods do not suit the special needs of experienced supervisors but the discussion-group methods draw on the know-how of each participant for the benefit of all, he pointed out. The conference leader may be either a member of the Mineral Extension Services staff or a local supervisor who has been trained as a group leader. The Mineral Extension Services now is preparing a course to train conference leaders, Mr. Hewes stated.

How his own company evolved a training program to guarantee adequate supervision for greatly enlarged operations and how that program has been expanded to speed the work of present supervisors and provide a reservoir of future supervisors and promising youngsters was described by Mr. Reilly. With the program in charge of the company's safety director, 186 men have been helped to certification already. These men, together with those who are qualified to take over supervisory work when opportunity comes, make up 12 percent of the company's total employees, Mr. Reilly reported. With this surplus of potential supervisory personnel, competition among supervisors is kept lively.

Local high-school instructors, teaching courses in mathematics and English, are helping present supervisors keep ahead of their desk and paper work, Mr. Reilly pointed out. These same teachers, offering courses in coal mining as a part of the regular high-school curriculums in nearby towns, are persuading local youngsters to take up coal mining as a livelihood. Twenty-five percent of the boys who have taken this course since its beginning in 1945 now are working in the company's mines and some of the others have gone to college to equip themselves still better for mining. High-school enrollees are offered summer employment in the company's mines, in the course of which they are frequently transferred from one job to another to gain wide familiarity with operations.

Enlarging its recruiting program still further, the company now is helping in setting up community youth centers in an effort to show that life in a mining community is pleasant and interesting. The outlook for the future of the company and its employees is better because of this broad training and educational program, Mr. Reilly declared.

Since the worker himself is the most important factor in mine safety, a program of safety training should be designed to stimulate the worker's awareness of safety principles and safe work practices, Mr. Beamer urged. Useful tools in safety promotion are contests, first-aid instruction,

KENNAMETAL Drill Bits

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Smooth, straight holes drilled with Kennametal bits cost less, save time, and reduce maintenance expense. Compared to other types of bits used for the same purpose, they require less power to drive . . . stay sharp much longer. The tough, hard Kennametal tip stands up longer; has high resistance to abrading, bending, or failing.

It's no wonder Kennametal drill bits have moved up so rapidly among mine operators. For, in addition to fast, low cost drilling in coal, they have the strength and hardness to drill through hard rock and slate.

You can't be handicapped by slate or bony "partings" when you drill with Kennametal. Its sharp, hard edge "bites" in quick, drills right through the rock—ordinarily it's no more difficult than drilling coal.

Kennametal-drilled holes are clean, single-gage—the charge has maximum effectiveness, which results in better breakage and fewer loading difficulties.

Before you buy drill bits, think what these advantages mean to you. For more information write the Mining Division, Kennametal Inc., Latrobe, Pa.

Fast Drilling

The average drilling speed with Kennametal is usually up to 50% faster than with any other type of bit. Abrasion-resistant Kennametal (thought of as the hardest metal in coal mining) remains sharp over long periods of drilling.

Long Service

Data collected in mines all over the country show that it pays to have bits that last the longest. It saves labor cost in terms of handling, changing, and sharpening. Some mines report that these features alone more than pay for the extra cost of Kennametal bits. Kennametal bits commonly last longer than 500 ordinary steel bits.

Low Bit Cost

Many mines report bit cost reductions of as much as 50% before Kennametal bits are dull. Since they can be sharpened many, many times before they are worn out, the bit cost should be reduced even more in many, many instances.

Low Maintenance Cost

Whenever a bit dulls or breaks it loads the drill. Loads cause the drill to overwork. Sooner or later the drill goes off the job, into the maintenance shop. Winding costs are high. Extra drills are needed if too many wear out or burn up at one time. Kennametal drill bits are your protection against these problems. They operate at 25% to 50% less amperage.

What is Kennametal?

Kennametal is the name of a very hard, durable tool material that was developed by Philip M. McKenna, the president of Kennametal Inc. This new metal is made of powdered particles of various metals, such as tungsten carbide, cobalt, and sometimes tungsten-titanium carbide. In the fine-ground stage it takes 18,000,000,000,000,000 particles to fill an average-size sewing thimble. The powdered particles are formed into Kennametal solids by sintering the pressed ingredients together in special electric vacuum furnaces. In its solid state it has the best combination of strength, hardness, shock resistance, and rigidity of any metal processed by this method. Kennametal is called cemented carbide in industry, but it is distinctive from other carbides either by the process and or the ingredient that is used to manufacture it.

KENNAMETAL

THE WORLD'S LARGEST MANUFACTURER OF CEMENTED CARBIDE MINING TOOLS

safety meetings, group discussions, rewards, penalties, posters and slogans.

Citing safety changes induced by mechanization and the change from tonnage to day rates of pay, Mr. Beamer pointed out that the day rate does not encourage a man to take chances to boost his output; that job specialization has been increased, making it easier to integrate safety training with job training; and that supervision, though necessarily a bigger responsibility than formerly, can be closer that it used to be.

Summarizing, Mr. Beamer stressed the following points to be considered in safety training: (1) accidents are caused mostly by bad work habits; (2) good work habits therefore must be drilled into workers; (3) the supervisor is responsible for safety training; (4) therefore the supervisor must be qualified to teach; (5) instruction must be followed up by frequent checks; and (6) good work habits produce safety and bigger tonnages.

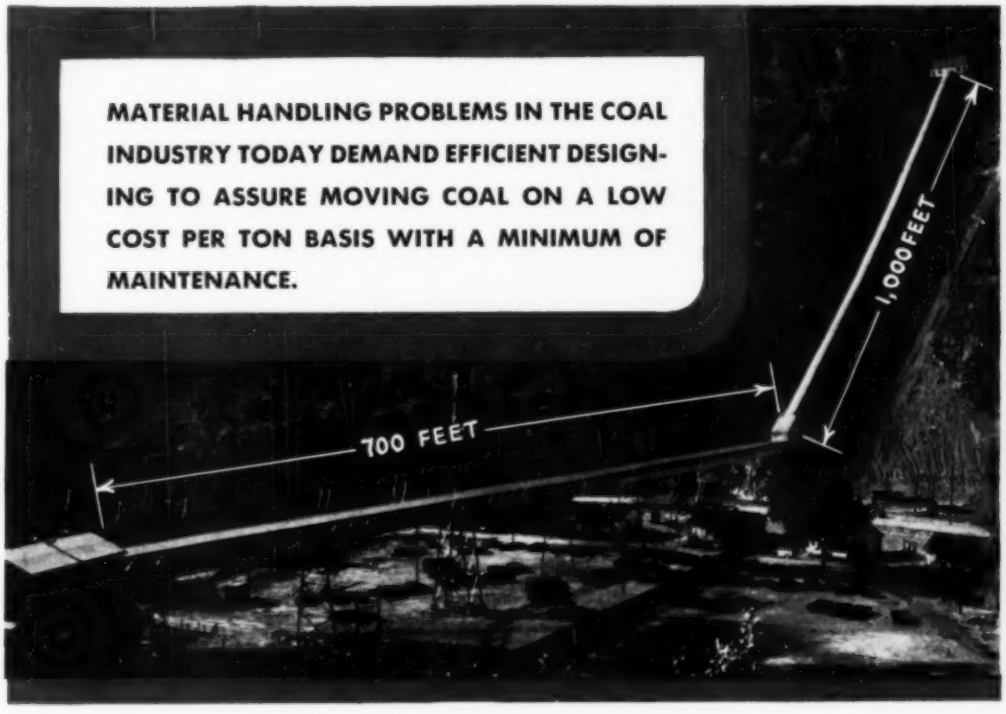
The maximum results of training have not yet been achieved, either in recruitment of new men or in upgrading of old hands, Mr. Spindler contended. This is partly because the coal industry has been reluctant to accept education as an integral part of its operations and as worthy of its support, he charged. To achieve better results, the industry must guarantee opportunity for advancement to men who improve themselves by study, offer employment security through improvement of a man's personal position and his family's status, and give real evidence of active interest and participation in training.

Suggesting ways for top officials to show their interest, Mr. Spindler listed the following: visiting classes and training shops, offering scholarships for advanced training and study, participating in drawing up a curriculum, giving summer employment to high-school boys and interviewing promising college students on their campuses.

Dean Holbrook, bringing the panel discussion to an end, called attention to vocational-training advances made in the past 40 or more years. "This," he declared, "is an evolution that has not yet fully reached the end of its advance." Since part-time education, though helpful, still is inadequate, he urged that full-time vocational education be made available by establishment of state-supported vocational-technical institutes to insure better supervision in the mining industry.

"We must strive to reduce our average rate of injuries from the present 60 per million man-hours to at least that of some of our operating companies, around 25 per million man-hours," declared Earl R. Maize, safety director, National Coal Association, who was the first of three safety speakers on the Friday afternoon program, Mr. Shoemaker presiding. This achievement will require the cooperation of all concerned—work-

"KANAWHA ALL THE WAY"



• Illustrated is the hillside and horizontal conveyor installation at the Shamrock No. 2 Mine of the Truax Traer Coal Company, Dorothy, West Virginia.

Capacity 600 tons per hour . . . Head House—Two 50 ton storage bins with variable speed blending feeders . . . Hillside Conveyor—rope and button type, 100 H.P. drive . . . Horizontal Conveyor—700 Foot centers, 42 inch belt, 50 H.P. drive.

Tipple equipped for run-of-mine loading for preparation elsewhere. All steel construction.

KANAWHA
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men, management and state and federal departments.

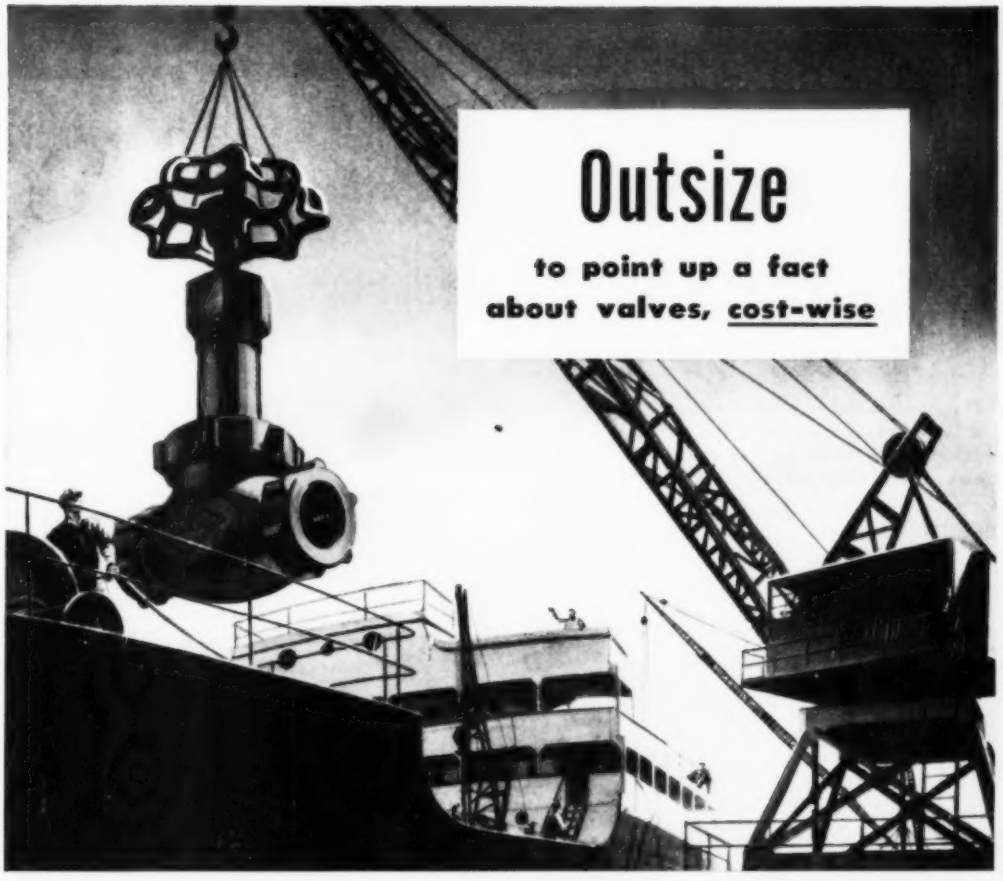
Listing some of the things the industry can do to improve its safety record, Mr. Maize cited the following: provide clean, clear working space, with prompt and proper roof support; provide air with sufficient velocity, volume and continuity to carry off noxious and flammable gases; keep rockdust close up to the face and in all places where dust accumulates; lay out adequate escapeways for each section of the mine; build haulageways with proper support and clearance and use well-laid track and safe rolling stock and locomotives; and provide safe tools and machines and maintain them in safe condition.

With tools, equipment and methods thus made safe, the industry also must consider its employees in planning for better safety, Mr. Maize declared. The foreman's knowledge of safety techniques must be increased and he must be constantly watchful to see that safety know-how is promptly used at all times. Likewise, workers must be trained to realize and accept their responsibilities to themselves and their fellow workmen. "It is far better to use our greatest efforts to prevent accidents than to use our energies explaining how accidents happen," Mr. Maize concluded.

Citing the enactment of Public Law 49 by the 77th Congress, providing for safety standards and inspection of coal mines by federal inspectors; the safety provisions of the 1941 wage agreement, which set up mine-safety committees; and the safety clauses in succeeding wage contracts, including the Federal Mine Safety Code, C. F. Davis, director of safety, U.M.W.A., stressed the union's long-term interest in a comprehensive national safety program and its faith in federal legislation that provides one set of safety rules and a uniform system of inspection in all coal-producing areas.

"We do not believe the Code to be a perfect instrument. . . . We believe, however, that compliance with all its provisions by all concerned, plus adequate supervision, would eliminate thousands of accidents each year." Stressing the union's belief that the elimination of recognized hazards and dangerous practices from the industry, plus intelligent cooperation by all concerned, could make coal mining one of the safest occupations in the nation, Mr. Davis pledged the entire efforts of the union to this end.

In departures from his prepared text, Mr. Davis reported that a study of inspector's reports passing over his desk showed that 65 percent of all violations listed never should have been allowed to get into an inspector's report because they should have been corrected at once by supervisors. This, he said, is "a terrible indictment of the coal industry's supervision." Most accidents occur from roof falls and haulage, the very points where supervision should be strictest, he pointed out. However, he paid high tribute to the cooperative spirit evidenced in the



NO SHIP was ever fitted with a valve this big. We took broad liberties with proportion in this picture because a valve's size can be misleading. In comparison with larger plant units, the cost of a single valve seems a minor, "petty cash" investment. But if, as here, *all* the valves could be viewed as *one* valve, you would see that valves actually represent a *major* expenditure.

In any plant, any building where operation involves fluid control, it pays management to keep this "collective" valve in mind. These days, especially. You pay more than ever today, in wages and material costs, for every operation in your plant—including valve maintenance.

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"PREVENT VALVE FAILURE" is a 28-page guide to valve economy, fully illustrated, with case histories of valve damage, and recommendations for its prevention by proper selection, installation, inspection, and maintenance. FREE on request. Write JENKINS BROS., 80 White St., New York 13, N. Y.

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Original Tank-Mounted "Colmol" in Operation

THE LATE DAVID M. SPRATT, chief engineer, Sunnyhill Coal Co., Pittsburgh, Pa., at the time of his death in an airplane accident Nov. 12, 1947, is shown operating the first tank-mounted model of the Colmol (Coal Age, December, 1948, p. 84). Mr. Spratt is credited by company officials with directing much of the experimental work on the first machine and giving unsparingly of his time and effort to construct it. In fact, he met his untimely death while transporting hydraulic equipment for use on the unit.

Joint Industry Safety Committee, stating that out of 67 safety cases that have been appealed to the committee, 66 have been settled amicably and, with but one exception, unanimously.

Drawing on his experience as consultant to the Japanese government on coal-mine safety and as reviser of the Japanese coal-mine safety law under the military government, R. G. Warnecke, mining engineer, Health and Safety Division, U. S. Bureau of Mines, summarized some of the reasons for Japan's high accident and fatality rate and low productive efficiency, including difficult mining conditions, antiquated machinery and methods, inadequate supervision, division of responsibility, and the unwillingness of workers to assume any responsibility for their safety.

In 1946, for example, Japanese mines produced 22,523,336 metric tons and experienced 920 fatalities and 61,112 injuries, or 24,500 tons per fatality and 370 tons per injury, he stated. A similar accident and fatality rate in the United States would have meant about 22,000 fatalities and over a million injuries in 1946, he explained. Although the safety record now is much worse than before the war, there is hope of improvement to be found in some mine-rescue and first-aid training, a few improved safety devices, more active work by mine-safety committees and government agencies and more frequent mine inspections, now occurring semi-annually or, in gassy or otherwise dangerous mines, a little oftener, Mr. Warnecke said.

Australian Mines Chief To Tour U. S. Operations

David T. Brewster, chief inspector of coal mines for New South Wales, Australia, has arrived in the United States for a three months' tour of coal-mining districts. Following his study of American operations, he is to recommend the best modern methods to develop two new state mining projects, at Awaba and Burrangorang, New South Wales, and also plans for open-cut mines under consideration for various areas.

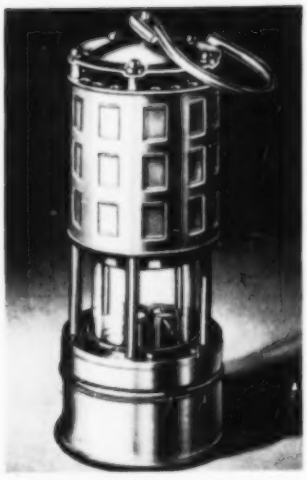
There are two schools of thought among mining men in the section, it is reported. One group holds that in all new mines there should be no other system of development than by conveyors for handling and transporting the coal. The other favors ordinary direct mining with scoops and trucks and various types of haulage. Mr. Brewster said that he wanted to see sufficient operations here to enable him to decide which would be the most suitable system for New South Wales.

He also will investigate systems of stowage by hydraulic means or compressed air to combat subsidences following large-scale excavations. Stowage is a major issue in the mining industry in Australia, particularly in the important Maitland-Cessnock field in New South Wales, where the high-grade gas coal has been intensively worked for over 30 years.

Mr. Brewster, in addition to being chief inspector of coal mines, is chairman of the New South Wales State Coal Mines Control Board.

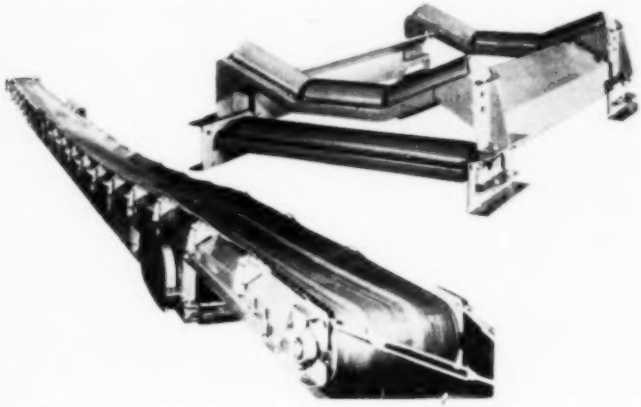
Equipment News

More Detailed Information and Descriptive Literature Normally Are Available on Request Directly to the Manufacturer

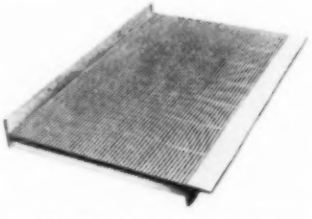


FLAME SAFETY LAMP — New, lightweight "National" model Koehler flame safety lamp is reported by the manufacturer to offer new engineering ideas in addition to all the safety and operating features of the standard Koehler and is said to be the lightest, smallest, most convenient permissible safety lamp produced. Constructed of durable aluminum alloys, the National model weighs only 1 lb. 12⅛ oz. and is 8¾ in. high. It is not affected by moisture or dampness, will not rust or corrode and offers a new igniter design with fewer parts and simplified construction for easy maintenance, it is said. The unit is exclusively distributed by National Mine Service Co., Beckley and Logan, W. Va.; Forty Fort, Pa.; Jenkins and Madisonville, Ky.

SUGGESTION BOX — New modern suggestion panel box, with either one, two or three panels, available in attractive hammer-tone silver finish on heavy-gage steel, has been announced by the Elliot Service Co., Dept M 10, 30 N. MacQuesten Parkway, Mt. Vernon, N. Y. Posters and bulletins are displayed in a burnished stainless-steel frame said to blend harmoniously with the background finish. The steel suggestion receptacle and panels can be used separately if desired.



BELT CONVEYOR SYSTEM—Among the features of its "Unitized" conveyor system, according to Transall, Inc., 109 North 11 St., Birmingham 4, Ala., is the Transall idler, which has precision ball bearings in each roller and is lubricated with high quality, non-oxidizing, non-emulsifying sealed-in lubricant, features that combine to provide freer turning rolls, less wear, lower starting movement and less power required. A resilient mounting of Neoprene is said to cushion each roll and rolls are self-cleaning. Idler mountings are of standard mounting widths and are available as individual idlers or in "Unitized" sections. For the entire conveyor unit, the manufacturer cites these features: minimum heights of head section, main chassis, and tail section; spill shields for complete belt protection instead of conventional deck plates; compact drive and power unit; short maneuverable tail section; return idlers assembled in composite unit with troughing idlers; adaptability to installations requiring frequent moves; and simplified structures for permanent installation.



SCREENS — New screen types for stationary, revolving and vibrating equipment have been reported by the Hendrick Mfg. Co., Carbondale, Pa., for its Wedge-Slot screen, which has a continuous slot for its entire length, with tapered profile bars assembled with U-shaped holders. In addition, Hendrick now is making a screen with parabolic head flanges for dewatering and screening-out wet undersize material and impurities. Other new types, according to the manufacturer, include screens with very small bars to provide greater open area; screens with heavy bars with protecting head flanges to resist abrasion; and special screens for various units. Wedge-Slot screens are made of plain and abrasion-resisting steels, stainless steel, copper-bearing steel, bronze and brass alloys, aluminum, etc.

SCREW TAKE-UPS — Dodge Mfg. Co., Mishawaka, Ind., has announced two new take-up units. The Dodge

Kelly's Creek Colliery Company

solves a costly maintenance problem with

J&L HEAT-TREATED JALLOY STEEL

J&L STEEL

Untouched photographs of the sluices in the McNally-Pittsburg Coal Washer at the Maiden Mine, Mardisville, W. Va. (Above) Sluices filled with fast-moving coal and water. (Right) Water flows over the exposed JALLOY plates.

Sluice-plates formerly replaced monthly . . .

Now heat-treated JALLOY plates last 10 times as long

Slide 300 tons of coal *an hour*—day in and day out—down the steel sluices of a coal washer, and you would *expect* the bottom plates to wear out rapidly. Kelley's Creek Colliery Company* considered monthly replacements quite normal for sluice bottom-plates—until they put in J&L *heat-treated* JALLOY Steel. Now they get 10 times longer service. This means lower maintenance cost . . . higher profits.

But that's not all! Conveyor sides and bottoms of mild steel generally lasted 3 months at the most. A year ago JALLOY plates were installed . . . Present indications are that these plates will be in service at least *another year* before replacement is necessary. That will mean a minimum of *8 times* longer service.

JALLOY is a heat-treated, manganese-molybdenum steel developed by J&L for just such uses as these—for resisting extreme abrasion and heavy shock.

Manufacturers and maintenance men, alike, find that JALLOY heat-treated plate makes equipment last longer. The outstanding wear-resistant properties of this *modern* steel have been proved again and again in such applications as: Bulldozers . . . Scrapers . . . Rock crushers . . . Power-shovel buckets . . . Dump cars . . . Truck bodies . . . and Sand-blast equipment.

If abrasion is a limiting factor in the life of *your* equipment or products, you'll find it profitable to investigate JALLOY. Let us send you the booklet mentioned in the coupon.

*Subsidiary of The Valley Camp Coal Co., Cleveland, O., producers of "Valley Camp" coal.

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PRINCIPAL PRODUCTS: HOT ROLLED AND COLD FINISHED BARS AND SHAPES • STRUCTURALS AND PLATES • HOT AND COLD ROLLED STRIP AND SHEETS • TUBULAR, WIRE AND TIN MILL PRODUCTS • "PRECISIONBILT" WIRE ROPE • COAL CHEMICALS

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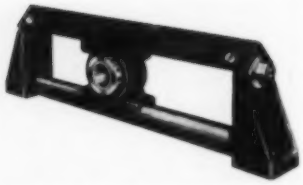
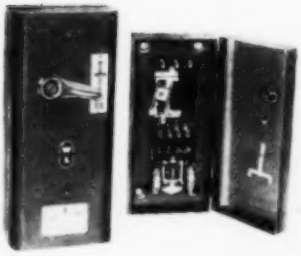


Type E take-up was reportedly designed as a roller-bearing-equipped take-up available from stock at moderate cost. The bearing used is the inner unit of the Dodge-Timken Type E roller-bearing pillow block. The Dodge Type H take-up, according to the company, is a moderately priced take-up designed for general conveyor and elevator service. The bearings are babbitted, faced on ends and equipped with standard pressure fittings. Load on bearing may be applied in either direction. For both units, positive adjustment is effected by turning screw heads at either end. Adjusting screws are plated and the angle top member is said to provide effective protection against dust and dirt. The units have a welded steel frame. A wide range of sizes is carried in stock.

STARTERS—Ward Leonard Electric Co., Mt. Vernon, N. Y., has announced three new magnetic starters. Bulletin 4130 a.c. combination magnetic starters with circuit breakers (above) are said to fulfill N.E.C. requirements for motor branch-circuit overcurrent protection, disconnect means, motor-running overcurrent device and motor controller. The units are available in five standard sizes to 200 hp., 3 phase, 550 volts, 60 cycles maximum.

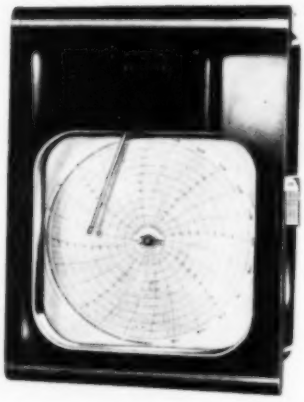


Bulletin 4112 Size 2 a.c. and Bulletin 4113 Size 3 a.c. magnetic starters are solenoid-operated starters intended for use in general and special purpose applications where across-the-line, non-reversing starting of polyphase squirrel-cage induction motors and single-phase motors is permissible. Starters are available with open-type construction for built-in or specialized controls, or with NEMA Type I General Purpose Enclosures. They can be controlled by separate pilot devices or can be supplied with local control pushbuttons or selector switches. Size 2 a.c. magnetic starters mave a maximum enclosed rating of 25 hp., 440-550 volts, 3 phase, 60 cycles; Size 3 a.c., 50 hp., 440-550 volts, 3 phase, 60 cycles. Standard operating coils can be supplied on both types for 110-, 208-220, 440 and 550 volts, 25 or 50-60 cycles. Dual-voltage coils can be furnished for 110/220 or 220/440 volts; 60 cycles.

Bulletin 102 miniature magnetic relays also announced by Ward Leonard are designed for automatic- and remote-control circuit applications where space is extremely limited. The units are 1⅛ in. high, 1⅝ in. long and 1 in. wide and have a metal base and solder-type terminals. They are available for operation directly on 115 volts a.c., 60 cycles, or 32 volts d.c.

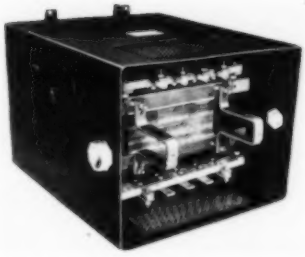
BRAKE-LINING RIVETER — New portable industrial riveter and kit has been announced by the Raybestos and U. S. Asbestos Divisions of Raybes-

tos-Manhattan, Inc., for use in riveting brake linings to brake bands and brake shoes on shovels, cranes, draglines and tractors which use bands up to 10 in. in width, either external or internal, and 7, 8 or 10 Series tubular rivets. The kit complete with a handy carrying case includes a hand riveter, drills, counterbores, clamps and a wrench.



VENTILATION - PRESSURE RECORDER—Newly developed Series 500 mine-ventilation-pressure recorder announced by The Bristol Co., Waterbury 91, Conn., is said to incorporate a number of new housing and operating features designed to make the unit easier to use and more convenient to service. The instrument has a range from 4 in. of water pressure to zero to 4 in. of water vacuum, and is available with either a 24-hour or 7-day chart drive.

NEW ROLLER-CHAIN FASTENER that is said to provide greater safety and a reduction in the possibilities of shearing has been announced by the Atlas Chain & Mfg. Co., Philadelphia 24. A type of retaining ring that has no dangerous points exposed to catch on clothing, the fastener is reported to utilize three interval equally spaced teeth, is sprung radially into a groove on the pin and maintains a tight groove tension at all times. Disassembly can be speedily and easily accomplished with a screw driver.



DISTRIBUTION TRANSFORMERS—Two types each of single-phase and three-phase dry-type distribution transformers, for providing specific voltages for auxiliary lighting and power circuits, have been announced by Wagner Electric Corp., 6400 Plymouth Ave., St. Louis 14, Mo. Two-winding dry-type transformers are built as single-phase Type AE in sizes 250 va. to 200 kva., and as three-phrase Type AP in sizes 3 to 300 kva., in the 600-volt class and below. Dry-type autotransformers are built as single-phase Type AA in sizes 500 va. to 25 kva., and as three-phase Type AM in sizes 5 to 50 kva., both types 240 and 240/120 volts. All have Class A insulation and are rated 55-deg.-C.-rise continuous duty.

STUD DRIVER—Mine Safety Appliances Co., Pittsburgh, Pa., has announced a new smaller model of its powder-actuated driver that embeds studs in steel or masonry by the discharge of a blank cartridge. Either $\frac{3}{8}$-in. or $\frac{1}{4}$-in. studs may be used by interchanging the barrels of the 5-lb. tool and there are several varieties of studs available. The embedded studs are said to have a holding power up to several thousands of pounds. Accidental discharge is minimized by a safety-arm attachment controlling the firing pin and there is no recoil or flash. The tool may be operated with one hand.

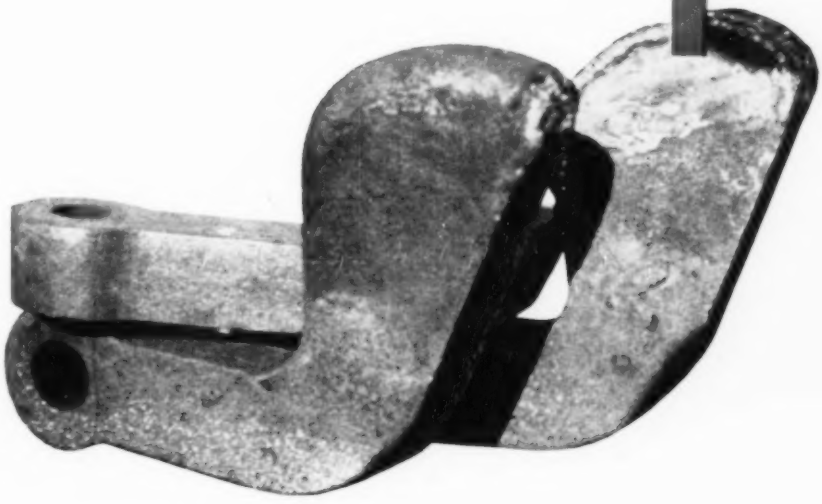
EARTHMOVER—The largest unit of its line of "Payloader" tractor-shovels, Model HM having a bucket capacity of $1\frac{1}{2}$ cu.yd. and a static loading capacity of 6,000 lb., has been announced by The Frank G. Hough Co., Libertyville, Ill. The new rubber-tired unit is reported to be the first of the line to feature a four-wheel drive,

crushes more coal

crushes maintenance costs

stays on the job 8 times longer

...when hard-faced with **STOODITE!**



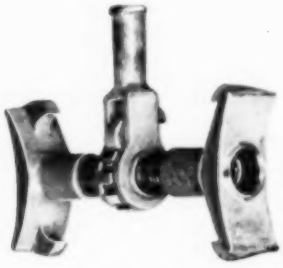
700 TIMES PER MINUTE these flex tooth hammers pounded their way through lump coal in a sizing operation. In every minute of operation *wear* was at work, reducing hammer size, lowering crusher output. After only 3 months' use, unprotected hammers had to be replaced to maintain crusher efficiency.

Then a $^{3}/_{16}$" overlay of STOODITE, a highly abrasion-resistant Stoody Alloy, was applied by D.C. electric arc to the worn areas, rebuilding to original size. STOODITED Hammers *are now operating a full year* with only slight wear, are being re-hard-faced a second time with equal results. Here's an 800% gain in operating life, more uniform efficiency with elimination of unnecessary shutdowns for replacements—*all for a few dollars invested in the right hard-facing alloy!*

If you're losing operating time, spending unnecessary dollars for equipment replacement because of wear, investigate STOODY HARD-FACING ALLOYS. There's a type for every problem—whether wear is caused by abrasion, impact, heat or corrosion. Call your nearest Stoody dealer for detailed information. Literature is available.

STOODY COMPANY 1143 W. SLAUSON AVE., WHITTIER, CALIF.

is powered by a 76-hp. engine and has four speeds forward and reverse, with a top speed of 16 m.p.h. Several auxiliary attachments are available.



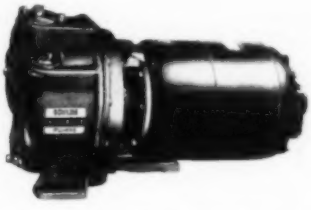
PUSH-AND-PULL JACK—New Simplex Cramer-type push-and-pull jack recently announced by Templeton Kenly & Co., Chicago 44, reportedly is designed for safer and faster lining of piles and for various heavy construction jobs. The two stock models have a rated capacity of 12 tons. Model No. 5 is 11 in. in length (closed), extends to 17 in., and weighs 34 lb. Model No. 6 is 18 in. long, extends to 30 in., and weighs 42 lb.

FOOT BATH—Stalwart Rubber Co., Bedford, Ohio, has announced a new all-rubber foot-bath tray molded from one solid piece of rubber specially compounded to withstand the chemical reaction of antiseptics used in combating athletes' foot and ringworm. A "waffle" tread molded on the inner bottom of the tray is said to ensure firm footing and prevent slipping. The unit measures 21x21x3 in.

FILING CABINET—New "Draw-in-Dex" cabinet for filing blueprints and drawings manufactured by Empire

Development Corp., 209 Union Trust Bldg., Washington, D. C., is said to accommodate up to 1,000 prints, any of which can be immediately removed or replaced without disturbing the others. The unit is built of fire-resistant steel, measures 20x30 in. and is 4 ft. high. Drawings are held by suspension rods on hinges.

CUTTER CHAINS AND BITS—Precision Chain Co., Terre Haute, Ind., has announced a new rivetless cutter chain which, through a design featuring greater rigidity and lateral stability, is said to offer longer wear, produce less dust and consume less power. Made of drop-forged alloys (no castings), the chain features a hardened journal pin that reportedly is locked against endwise shift and rotation. New "Multiplex" bits are so designed as to promote lateral cracking out of the coal between the bit tracks, with bit holders and links shielded behind the middle cutting blades for protection against damage from coring, the company states. Adaptor clips are available for equipping chains presently in service with Precision bits without changing the cutterbars.



PUMP—Its new "Industri-Jet" pump is reported by Gould Pumps, Inc., Seneca Falls, N. Y., to be a combination of a centrifugal pump with the jet or ejector in one compact unit, specially designed for economical dependable operation with relatively small capacities against high pressures. The unit is built in nine sizes from ¼ to 5 hp., with capacities up to 35 g.p.m. and for pressures up to 190 lb. It is said to be suitable for

YOU'LL get more payload per pass and more passes per hour . . . step up production 10 to 50% . . . when you use a Page Automatic and use it correctly. Quick loading and immediate hoisting are the keys to big yardage. The closer the cycle of operation approaches that of a grab-bucket, the better the yardage will be. Page Automatics land in digging position, dig right in at the first pull on the loadline and get full payload within 1 to 2 bucket lengths, regardless of depth . . . 20 ft. to 100 ft. or more. With most of your operations under or near the boom end, minimum hoisting power is required.

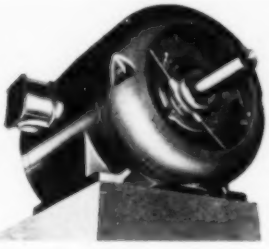
The Page Automatic is the bucket that takes most of the "drag" out of your dragline . . . full loads in shorter distances save bucket and cable wear, reduce maintenance, minimize operator fatigue. Page Automatics are available in any size from 3/8 yd. to 30 yd. Each Automatic is guaranteed to out-dig any other dragline bucket of comparable size. For detailed information, see your construction equipment distributor, or write for Bulletin 1519.

PAGE ENGINEERING COMPANY
Clearing Post Office, Chicago 38, Illinois

PAGE *Automatic*
DRAGLINE BUCKETS and WALKING DRAGLINES

handling a wide range of liquids and for various pumping services.

CHAIN SAW—New lightweight gasoline-engine-driven saw, with an all-purpose chain for both ripping or cross-cutting and designed for either one- or two-man operation, has been announced by McCulloch Motors Corp., Los Angeles 45. The 5-hp. power unit reportedly is a special McCulloch magnesium die-cast engine, with a full-360-deg.-swivel bevel-gear transmission that permits cutting in any position. The cutting blade is available in lengths up to 5 ft. and the entire unit is said to weigh only 38 lb.



ELECTRIC MOTOR—Wagner Electric Corp., St. Louis 14, Mo., has announced the availability of totally enclosed fan-cooled motors in the 736 frame size, in ratings of 200 hp. at speeds of 3,500, 1,750, 1,160 or 870 r.p.m., 550 volts or less, and 150 hp. at the same speeds for operation on 2,300 volts. The motors are approved for Class I Group D and Class II Groups E, F and G hazardous locations, the company reports.

MOTOR MAINTENANCE—New self-adhesive motor-lead markers and motor-connection diagrams on a new "Hi-Heat" resistant material that is said to continuously withstand heat up to 300 deg. F. and not curl, dry out or fall off, are available from W. H. Brady Co., 815 North Third St., Milwaukee 3, Wis., for use in installing new motors and repairing old ones. Catalog available lists and illustrates 19 different motor hook-ups and 20 of the most generally used motor-lead markers.

PORTABLE ELECTRIC DRILL—New Thor "Silver Line" ½-in. drill is designed for continuous, stall-free drilling through toughest metals, according to the Independent Pneumatic Tool Co., Aurora, Ill. Ventilation

Exclusive BWH ROTOCURE Process of Continuous Vulcanization means continuous, trouble-free operation

Yes, all types of industry have discovered this fact . . . BWH ROTOCURE Belts do an outstanding job. And the record made by this Pennsylvania coal mine conveyor is a typical example of their performance. It's a veteran of many years' service through dark, dank tunnels. It has lugged giant, cumbersome cargoes at gratifying low per-ton costs. And it's still carrying on today.

One reason for such long, distinguished service is the special BWH process which inhibits mildew. But it's the exclusive BWH ROTOCURE Process of continuous vulcanization which accounts for the extraordinary stamina not only of this belt, but of all BWH belts.

What is ROTOCURE? It's a process developed by BWH technologists to produce conveyor belts that are 4-ways better, because:

1. ROTOCURE eliminates the press overlaps which occur in the duck carcass every 30 to 40 feet in belts made in flat press. Scientific tests prove such overlaps may reduce flex life as much as 40%.
2. ROTOCURE eliminates mechanical distortion, often occurring at press ends in flat-press curing.
3. ROTOCURE eliminates uneven stretch, because this method maintains constant, uniform stretch control throughout the curing process.
4. ROTOCURE eliminates overcure caused by press overlaps in rubber covers of conveyor belts and makes the covers uniformly abrasion resistant.

☆ ☆ ☆

HAVE YOU A JOB WHERE STAMINA COUNTS? Bring us your toughest problems. We're specialists in solving them. Consult your nearest BWH distributor or write to us direct.

Another Quality Product of

BOSTON WOVEN HOSE & RUBBER COMPANY

Distributors in all principal cities

PLANT: CAMBRIDGE, MASS., U. S. A. • P. O. BOX 1071, BOSTON 3, MASS.

through large slotted ports is said to keep the Thor heavy duty motor constantly cool under heavy load.

WELDING ELECTRODES—Hobart Bros. Co., Troy, Ohio: Nickelcast, a 100-percent nickel electrode for producing machinable welds on cast iron without preheating the metal; a.c. or d.c. operation; available in 3/32-, 1/8-, 5/32- and 3/16-in diameters. No. 90-PL, a low-hydrogen coated electrode designed for welding high-carbon, high-sulphur and other hard-to-weld steels without underbead cracking; d.c. only; 3/32-, 1/8-, 5/32-, 7/32- and 1/4-in. sizes.

Lincoln Electric Co., Cleveland 1, Ohio: Softweld, a non-ferrous electrode for depositing dense soft machinable welds on gray iron castings; a.c. or d.c. 1/8- and 5/32-in. sizes. Two tubular-type shielded-arc electrodes, Faceweld No. 1 and Faceweld No. 12, both available in 5/16- and 3/16-in. sizes, a.c. or d.c.; No. 1 deposits a chromium-carbide-type alloy for hard-facing carbon, low-alloy or manganese steel, for severe abrasion and moderate impact; No. 12 of same type, but for extremely severe abrasion and some impact.

North American Phillips Co., Inc., 100 East 42 St., New York 17: new-type manual arc-welding electrode available in ferritic, iron-oxide and organic types, with special coating; a.c. or d.c. reverse or straight polarity, 5/16-in. size usable at currents up to 600 amp.

Eutectic Weldings Alloys Corp., 40 Worth St., New York 13: Eutechrom 2, a superhard, low-heat rod designed as a universal rod to overlay worn or defective parts; a.c. or d.c.; 1/4-, 3/16- and 1/8-in. sizes. Eutecrod 1700, a high-silver alloy developed for stainless steel, copper, brass, bronze, tungsten carbide or steel; bonds at 1,020 to 1,250 deg. F.; 3/32-, 1/16-, 3/64-, 1/32 and 1/64-in. sizes. Eutec-Silver-Weld, a high-silver alloy in a pocket container designed for easy low-heat joining of all metals in the small shop and home.

All-State Welding Alloys Co., Inc., White Plains, N. Y.: No. 18/8 a.c. or d.c. stainless-steel electrode developed to weld stainless-steel Types 301, 302, 304 and 308; 3/64-, 1/16-, 3/32-, 1/8-, 5/32- and 3/16-in. sizes.

Stoody Co., Whittier, Calif: Stoody Self-Hardening 21 for application involving extreme abrasion with moderate impact is available in various diameters in coated and bare types. Stoody 1027 for severe impact with moderate abrasion comes in various diameters, coated only.

CHAIN VISES—Baldwin-Duckworth Division, Chain Belt Co., 369 Plainfield St., Springfield 2, Mass., has announced two new Baldwin-Rex chain vises designed to simplify taking roller chain apart. According to the manufacturer, the forged-steel jaws securely hold the chain while properly applied blows with an ordinary drift will quickly remove the

For fast and thorough clean up on both . . .

HIGH COAL and LOW COAL

THE CLARKSON *Redbird*

TYPE 24 BB
UNIVERSAL LOADER

Get the details for <u>your</u> operation

The CLARKSON MANUFACTURING CO.
Nashville
Illinois

pin. Vise No. 1 will handle single-width roller chains from ½- to 1-in. pitch and double-width roller chains D-40 and D-50. Vise No. 2 will handle single-width chains from 1- to 2-in. pitch and double-width chains from D-80 to D-160.

RESPIRATOR—New R-2900 respirator for protection against light concentrations of nuisance dusts has been announced by American Optical Co., Southbridge, Mass., for various exposures not involving pneumoconiosis-, silicosis- or asbestosis-producing dusts. The unit permits unobstructed front and side vision and has a lightweight, inexpensive and easily replaced filter and a light and durable retainer cup, the company states. The face mask is molded from high quality rubber.

Industrial Notes

Mines Engineering Co., Chicago, Ill., has reported that George H. Chapman of its organization has been named an Officer of the Order of Leopold II by the Belgian government for services rendered that country in 1944 and 1945 while he was serving as a major in the U. S. Army assigned to SHAEF. Mr. Chapman's work while on active duty with the army was exclusively in coal production from indigeous sources in Alaska, France, Belgium, The Netherlands and Germany.

R. G. LeTourneau, Inc., Peoria, Ill., and Longview, Tex., has appointed Hans A. Bohuslav as a special engineering consultant to R. G. LeTourneau, with headquarters in Longview. Wendell V. Richards, formerly Washington, D. C., district sales representative, has been made central sales manager for the company, with headquarters in Peoria, succeeding W. B. Worden, resigned.

Manhattan Rubber Division, Raybestos-Manhattan, Inc., Passaic, N. J., Oct. 28 completed its 55th year of operation. Manhattan traces its ancestry to the first chartered rubber company in America, the Roxbury Rubber Co. of Boston organized in

PIPE now Available

Carlon E Flexible Synthetic PIPE for Low Pressure Mine Operation

Two girls easily lift one 200 ft. coil of Carlon E Pipe weighing only 100 lbs. Easy to handle and install.

After years of research and exhaustive tests Carter has developed a new flexible synthetic pipe—acid resistant, flexible, light in weight and economical—which completely meets the requirements of low pressure mine operation for pressure, suction or sprinkler applications.

Sizeable installations have been made in mines of leading coal companies and actual use has proved the durability and dependability of Carlon E and satisfactorily demonstrates its many superior advantages.

PHYSICAL PROPERTIES—Severe tests prove that Carlon E Pipe is *completely impervious to acid reaction* and it can be safely claimed to have a projected corrosion-free life of at least 20 years. Carlon E Pipe retains its flexibility and toughness at all temperatures ranging from 50° below zero to 100° F.

LABOR SAVING—Ease of installation and handling is a special feature of Carlon E which saves time and labor. In the first place it is extremely light in weight. A 200 ft. section of 2" pipe weighs only 100 pounds—⅓ the weight of steel pipe of comparable length and diameter. Its flexibility facilitates handling as it adjusts itself to varying heights of the floor and can be readily extended around corners without use of ells or tees. This feature, as well as the fact that it only requires one coupling to each 200 ft. section, greatly increases ease and speed of installation. In a test under heavy muck conditions two men installed 600 ft. of Carlon E complete with pump in 2 hours. To install steel pipe under the same conditions would have required 3 men over 6 hours.

PRICE—The price of Carlon E installed is comparable with steel at normal price. At present inflated steel prices Carlon E is decidedly cheaper.

AVAILABILITY—Carlon E pipe is in production and can be shipped within 2 weeks from receipt of order. Furnished in ½", ¾", 1", 2", 3" coiled, 4" and 6" in straight length. Carter corrosion-free couplings are available. Other standard types of couplings can be used such as King, Dresser and Victaulic.

Write for quantity prices and further information.

SPECIAL TRIAL OFFER

Carlon E is furnished in 200 ft. coils for easy handling. To enable you to make a practical trial and thorough test of this new synthetic pipe in your mine we will furnish one coil (200 ft.) of the 2" size at the 2000 ft. quantity price of 35c per foot, or $70.00 on the condition that if it does not prove entirely satisfactory it can be returned for full credit. *Order today.*

CARTER
PRODUCTS CORPORATION

Manufacturers of Extruded Plastics

10225 Meech Avenue, Cleveland 5, Ohio
Phone: BRoadway 6565

1833. In 1893, officials of that company founded The Manhattan Rubber Mfg. Co. with a newly built plant at Passaic, and it operated under that name until 1929 when it merged to form Raybestos-Manhattan, Inc. Today, Manhattan Rubber Division employs about 4,000 persons and the plant covers more than a 1,000,000 sq. ft. of floor space.

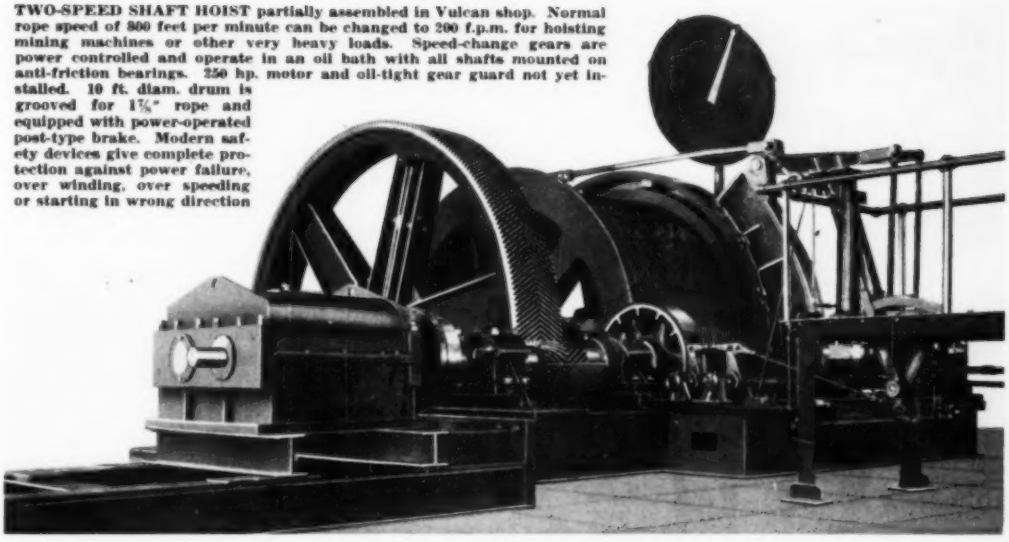
Anaconda Wire & Cable Co., New York, has named L. F. Hickernell chief engineer to direct the engineering and research policy of the company. L. L. Carter and D. E. Allen have been made assistant chief engineers, both located at Hastings-on-Hudson, N. Y. A. A. Jones has been appointed manager, engineering department, reporting to Mr. Hickernell. Anaconda has also announced the appointment of C. B. Peck, Jr. as assistant manager of industrial sales. Mr. Peck also will continue to function as manager of portable cable sales.

Baker Industrial Truck Division, Baker-Raulang Co., Cleveland, Ohio, has promoted G. B. Davis from assistant sales manager to sales manager. Mr. Davis, who actually has been in active charge of the sales negotiations for some time past, became associated with Baker-Raulang in 1935 and joined the sales staff of the Baker Industrial Truck Division two years later.

Western Machinery Co., San Francisco, has acquired the exclusive manufacturing and sales rights to the Fagergren Flotation Machine and has completed establishment of full sales and engineering service facilities for the unit. With the addition of this machine, officials state, the company's equipment provides complete coverage for all steps in the ore-dressing flowsheet. Servicing of the requirements of existing installations, including replacement parts, is available from the company. John M. Davis, metallurgical engineer, has joined the Wemco staff, with headquarters in the southeast, and Dan F. Beaton has joined the company as a sales engineer in the Salt Lake City office. Both will be concerned with metallurgical sales and service work for the company and its divisions, Mr. Davis in the eastern territory and Mr. Beaton in the Intermountain region.

Athey Products Corp., Chicago, has appointed G. O. Britton domestic sales manager and E. B. Schlenk district representative for the company's central territory. Mr. Britton joined Athey last May as assistant domestic sales manager. Before joining Athey, Mr. Schlenk was associated with the Roy C. Whayne Supply Co., Inc., Louisville, Ky.

Mine Safety Appliances Co., Pittsburgh, Pa., has appointed Paul A. May comptroller. He formerly was assistant comptroller, Minneapolis-Honeywell Regulator Co., and previously had been assistant comptroller



TWO-SPEED SHAFT HOIST partially assembled in Vulcan shop. Normal rope speed of 800 feet per minute can be changed to 200 f.p.m. for hoisting mining machines or other very heavy loads. Speed-change gears are power controlled and operate in an oil bath with all shafts mounted on anti-friction bearings. 250 hp. motor and oil-tight gear guard not yet installed. 10 ft. diam. drum is grooved for 1⅛" rope and equipped with power-operated post-type brake. Modern safety devices give complete protection against power failure, over winding, over speeding or starting in wrong direction

Vulcan Electric Hoists are backed by a

HUNDRED YEARS

of Successful Manufacturing Experience

Established 1849, in the heart of the fast-growing young anthracite industry, the Vulcan Iron Works soon became a leading builder of hoists and other mining equipment. Early Vulcan hoists were steam powered and many of these are still giving excellent service but when electric power became commercially available Vulcan engineers took quick advantage of its greater convenience and economy.

Throughout the many years of subsequent development and improvement full advantage has been taken of every proved advance in design, materials and accessory equipment, so that Vulcan electric hoists are unsurpassed, today, from every standpoint of safety, durability and operating convenience.

New designs, like the two-speed hoist shown above, are constantly being developed to meet specific operating requirements and correspondence regarding any hoisting problem is cordially invited. Our experienced engineers make money-saving suggestions, whenever possible, without charge or obligation.

VULCAN ALLCASTEEL SHEAVES are cast in our own steel foundry and machined after heat-treating to assure permanently accurate alignment. Besides being light, tough and strong they are so highly resistant to rope wear that NO LINERS ARE NEEDED. Available in all sizes, with either plain or anti-friction bearings. Write for 20-page bulletin C-396.

Vulcan Iron Works

Established 1849

WILKES-BARRE, PA., U.S.A.

Cable Address "Vulworks Wilkes-Barre"

Manufacturers, also, of Underground Conveyors and all types of Electric Locomotives for underground service.

for the Fruehauf Trailer Co. and secretary-treasurer of A. J. Gerrard Co.

Baldwin-Duckworth Division, Chain Belt Co., Milwaukee, Wis., has named Selma Foundry & Machine Co., Selma, Ala., a distributor for Baldwin-Rex products. The Selma organization will continue as a distributor for Rex chain and power-transmission machinery, which it has handled for some time.

Armco Steel Corp., Middletown, Ohio, has appointed Joe S. Thomas director of purchases and Charles Beck manager of raw materials supply. Mr. Thomas, who succeeds Newman Ebersole, deceased, joined Armco in 1927 and was formerly assistant director of purchases. Mr. Beck, who has been associated with the company for more than 22 years, formerly was assistant general superintendent of the Middletown division until named to the newly-created post of raw-materials supply manager.

Kennametal, Inc., Latrobe, Pa., has appointed Carroll Edgar a representative in the Seattle area. William L. Chambers, Kennametal application engineer, has been transferred from the midwestern district to the Pittsburgh district office. John D. Cook has been appointed an application engineer in the midwestern district, with headquarters in Kennametal's Chicago office.

Independent Pneumatic Tool Co., Aurora, Ill., has named William J. McGraw, formerly manager of electric tool sales in the New York territory, manager of its Cleveland branch. Ed B. Rosell, electric tool service engineer in the Chicago territory, succeeds Mr. McGraw.

Ahlberg Bearing Co., Chicago, has appointed as sales manager M. G. McGregor, formerly manager of replacement-bearing sales and associated with the company for 22 years. Mr. McGregor has served the company as a salesman, branch manager and manager of distributor sales.

Easton Car & Construction Co., Easton, Pa., has named David A. Pollock to its sales-engineering staff. Mr. Pollock has been associated with the Canadian Car & Foundry Co., Ltd., in Montreal, for the past 10 years and recently has worked with Easton Car in cooperation with CC&F on the installation of special-purpose Easton trailers in Canadian mines and quarries.

George Haiss Mfg. Co., Inc., New York, a subsidiary of Pettibone Mulliken Corp., has named W. E. Madden a vice president of the company. Mr. Madden was appointed sales manager of the Haiss conveyor division last year.

Titeflex, Inc., Newark, N. J., has appointed Manufacturers Sales Agency, 523 Brushton Ave., Pittsburgh 21, Pa., exclusive sales agents

M.S.A. Plant Employees Work Year Without an Accident

WOMEN EMPLOYEES of the Mine Safety Appliances Co., Pittsburgh, Pa., receive boxes of roses as the company completed an entire year without one lost-time industrial accident. Male employees were given cigarettes and both tokens of the achievement were accompanied by a congratulatory card. In the year from Nov. 13, 1947, an average of 1,138 employees worked 3,119,365 man-hours without a lost-time accident, H. F. Idzkowsky, safety director, reported. Employees at the M. S. A. Callery, Pa., plant have worked since August, 1944, without a single lost-time accident, for a total of 1,137,076 man-hours.

for the complete line of Titeflex products in western Pennsylvania and West Virginia.

Lancaster Engineering Corp., Lancaster, Pa., has named George E. Sprackling sales manager. Before joining Lancaster, Mr. Sprackling served as district manager for the industrial division, Oliver Corp., in New York, Pennsylvania and Ontario, and had previously been affiliated with the Cleveland Tractor Co. During the war, he served with the WPB; and later in the army with the Airborne Engineers.

Pennsylvania Crusher Co., Philadelphia, has acquired from the Straub Mfg. Co., Inc., Oakland, Calif., the exclusive manufacturing and sales rights in the eastern United States and Canada for the "Kue-Ken" line of jaw crushers and gyratory crushers.

U. S. Steel Supply Co., Chicago, has appointed Orville F. Figley manager, Chicago district. With the company for over 30 years, Mr. Figley has served as sales manager for the Chicago district for the past two years. Frederick L. Bruckner and Arthur W. Johnson have been named assistant district managers.

General Tire & Rubber Co., Akron, Ohio, has announced the appointment of four new branch managers and the opening in Richmond, Va., of a new branch sales outlet. The new branch managers are: Earl H. Schaub, Denver; Richard Graybill, New York; John W. Bogle, Richmond; and James J. Flasco, St. Louis. The new Richmond branch, located at 1725 Summit Ave., has more than 28,000 sq.ft. of warehousing space and will carry complete stocks of all General tires, it was reported.

Davey Compressor Co., Kent, Ohio, has appointed Thurston Cooke Equipment Co., Louisville, Ky., as a Class A dealer for the state of Kentucky. Davey also has appointed M. C. Burt Equipment Co., Rockford, Ill., as a dealer for its equipment in that area.

Trade Literature

Available Without Charge on Request to the Manufacturer

WIRE ROPE—The Colorado Fuel & Iron Corp., Wickwire-Spencer Steel Division, 500 Fifth Ave., New York 18. New comprehensive wire rope catalog, also commemorating the 50th anniversary of wire-rope making at the Wickwire rope mill at Palmer, Mass., includes new charts, tables, drawings and photographs to present a fresh slant on wire rope. The new catalog has three indexes that permit quick reference. The first section covers the characteristics of wire rope. The second section, divided into six parts, describes wire rope for specific industries. The third section deals with the care and handling of wire rope.

UNIT SUBSTATIONS—Allis-Chalmers Mfg. Co., Milwaukee 1, Wis. Bulletin No. 11B6285A reports on how new A-C standardized load-center unit substations pay off in power savings, better performance, greater safety, flexibility, easier installation and quicker delivery. Included are a simple and flexible monogram that simplifies selection of the correct air circuit breaker for any application, sizes and dimensions of load-center unit-substation transformers, vertical-lift metal-clad switchgear and Type L switchgear with air circuit breakers, together with space requirements of standard low-voltage switchgear.

TRACTORS—Industrial Power Division, International Harvester Co., 180 N. Michigan Ave., Chicago 1. Separate bulletins present design and performance details on four International diesel crawler tractors. Bulletin No. A-93-LL describes the International TD-18 with 88.5 drawbar horsepower; No. A-92-LL, the 57-hp. TD-14; and Nos. A-267-LL and A-266-LL, the TD-9 and TD-6 models of 39 and 29.5 drawbar horsepower, respectively. Work applications, sectional views, construction details and specifications are included in each folder.

V-BELTS—The B. F. Goodrich Co., Akron, Ohio. Catalog section on Goodrich Multicord and Grommet Multi-V belts describes construction of the belts and includes belt numbers, sizes and pitch lengths, together with a suggested procedure for designing drives using the company's Multi-V belts.

EXPLOSIVES—Olin Industries, Inc., East Alton, Ill. Booklet entitled "Explosives Products" covers use of industrial and mining explosives. In addition to providing a complete catalog of the company's explosives, with specifications and recommended use, the booklet also contains such useful information as wire-resistance and distance tables, comparisons of weight strength and density, burden on boreholes, suggestions for using electric blasting caps, sample calculations for field use and a list of 63 safety and handling "Don'ts."

FLEXIBLE COUPLINGS—The Falk Corp., 3010 West Canal St., Milwaukee 8, Wis. New Steelflex coupling "slide-rule" selector designed for use by those instrumental in the selection and purchasing of flexible couplings from Falk Sizes 3F up to size 18F. Its design is based upon the Falk "Three-Dimensional" method of selecting a coupling by horsepower, by application and by the speed at which the coupling is to travel.

WIRE ROPE—The Colorado Fuel & Iron Corp., Wickwire Spencer Steel Division, Palmer, Mass. New four-color sound film entitled "Indian Paint" is now available for public showing before any group or organization, on request to the company. The picture, which runs for 35 minutes, portrays the making of steel from ore to finished product—wire rope.

CABLE-REEL PARTS—National Mine Service Co., Beckley and Logan, W. Va.; Forty Fort, Pa.; Jenkins and Madisonville, Ky. Bulletin No. 486 describes the Bemeco bronze brush and holder assembly and the Bemeco ball-bearing intermediate gear and pinion, which are features of the Bemeco cable reel now available separately.

WIRE AND CABLE—Rome Cable Corp., Rome, N. Y. Catalog No. 22 on bare and weatherproof wires and cables contains tabular data, specifications on copper-carrying capacities and formulas for determining physical characteristics of copper. Manufacturing and inspection operations of the company are illustrated and described.

ROLLER CHAIN—Atlas Chain & Mfg. Co., Philadelphia 24. Catalog entitled "Atlas Roller Chain" lists prices and specifications for single and multiple roller chains ranging in size from No. 25 to No. 240. Prices and specifications for lug-type attachments covering this range also are included. Design and production improvements are discussed.

EARTHMOVERS—The Pettibone Mulliken Corp., Chicago 51. Bulletin No. SBC-1948 describes the Haiss heavy-duty bucket loaders equipped with integral-swivel-belt-conveyor discharge. Specifications of various models and illustrations of a wide variety of applications are included.

CORROSION - RESISTANT CONCRETE—Universal Atlas Cement Co., Lumnite Division, 135 East 42nd St., New York 17. Booklet, "Lumnite Concrete Floors—Corrosion-Resistant & Heat-Resistant," provides detailed information on service experiences and late developments and covers both the methods and materials used.

CRUSHER—Allis-Chalmers Mfg. Co., Milwaukee 1, Wis. Bulletin No. 07B6006E describes the construction and operating features of the A-C Type R reduction crusher equipped with "Speed-Set" control and automatic reset. Specifications, dimensions and capacities are detailed.

STEAM BOILERS—Babcock & Wilcox Co., 85 Liberty St., New York 6. New 16-mm. sound-color educational film, "Steam for Power," depicts the development and application of modern steam boilers and is available for showing before civic groups, professional societies, engineering students and others interested in the production and use of power.

SEMI-INORGANIC FLUIDS—Dow Corning Corp., Midland, Mich. Bulletin, "Silicone Notebook, Fluid Series No. 3," details the properties and behavior of the DC-200 Silicone fluids, known for their heat stability, shear resistance, relatively constant viscosity over a wide temperature range, lubricity, water repellency and good dielectric properties.

PROFESSIONAL SERVICES

Presenting...

The New, Lightweight "National" Model KOEHLER Flame Safety Lamp

WEIGHS ONLY 1 lb., 12 1/8 oz.

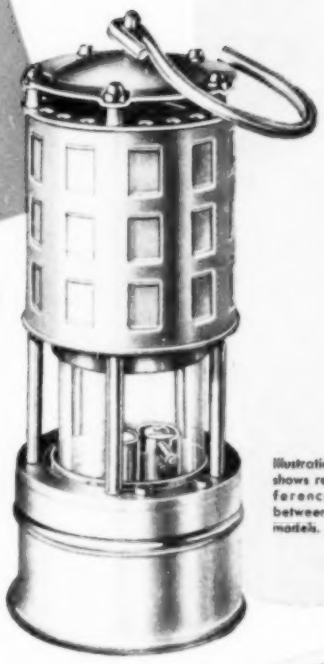


Illustration clearly shows relative difference in size between the two models.

The lightweight National Model embodies all the time-proved safety and operating features of the Standard Koehler—plus many new and advanced engineering ideas.

MORE CONVENIENT AND EASIER TO CARRY
Lighter—weight reduced to 1 lb., 12-⅛ oz.
Smaller—height reduced to 8-¾ in.

DURABLE—LIGHT
Newly designed, strong, rigid aluminum alloy construction

IMPROVED IGNITER
Fewer parts, easier to maintain

MEETS ALL OPERATING AND SAFETY REQUIREMENTS
U. S. Bureau of Mines Approved

Write for complete details!

Compare THE NEW NATIONAL MODEL WITH THE KOEHLER STANDARD

	NATIONAL MODEL	STEEL STANDARD	ALUMINUM STANDARD
WT.	1 lb., 12-⅛ oz.	3 lbs., 6 oz.	2 lbs., 9 oz.
*HT.	8-¾"	10-5/16"	10-5/16"

*Not including handle.

Approval No. 209

Distributed Exclusively by

National Mine Service Company

Has the facilities *Delivers the goods*

BEMECO DIVISION Beckley, W. Va. | ALL-STATE DIVISION Logan, W. Va. | KENTUCKY-VIRGINIA DIVISION Jenkins, Ky. | ANTHRACITE DIVISION Forty Fort, Pa. | WESTERN KENTUCKY DIVISION Madisonville, Ky.

Direct field representatives covering the major coal producing areas

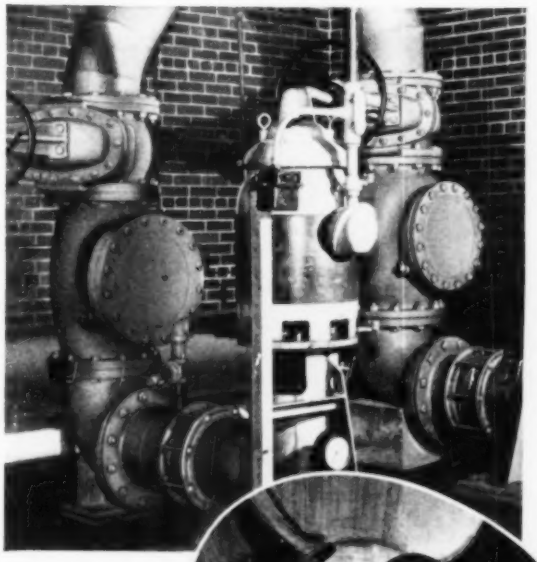
For complete selection in mine piping ..."Get it from CRANE"

ONE SOURCE OF SUPPLY
RESPONSIBILITY
STANDARD OF QUALITY

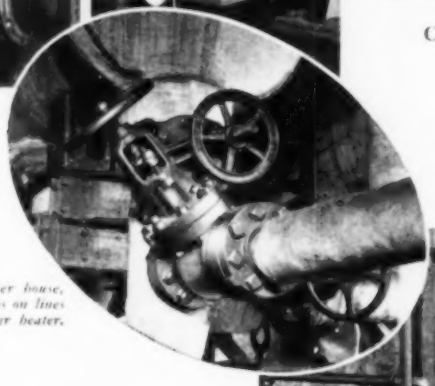
There is no easier, no more certain way to get the piping you need for power, process or general service mine installations. One order to Crane—through conveniently located Branches and Wholesalers—brings you the world's most complete selection of valves, fittings, pipe and accessories. One catalog gives you an unequaled choice of the best in brass, iron, steel and alloy materials.

Why not do as many leading mines have done and standardize on Crane? It is **One Source of Supply** broad enough to simplify all piping procedures, from design to erection to maintenance. **Undivided Responsibility** for materials helps you get better installations, avoids needless delays on the job. And for the **Highest Quality** in every item that makes for dependable piping performance—get it from Crane.

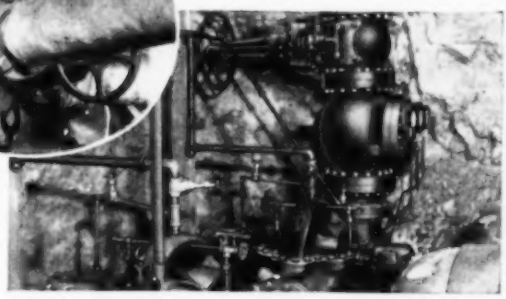
CRANE CO., 836 S. Michigan Ave.
Chicago 5, Ill.
Branches and Wholesalers
Serving All Industrial Areas



CRANE *Iron Body Gate and Check Valves on mine pumping installation.*



IN COPPER MINE *power house, Crane Steel Gate Valves on lines to closed feed hot water heater.*



IN A SILVER MINE, *Crane equipment includes 12-in. Ferrosteel Gate and Check Valves. Also brass, globes, angles and checks.*

EVERYTHING FROM . . .

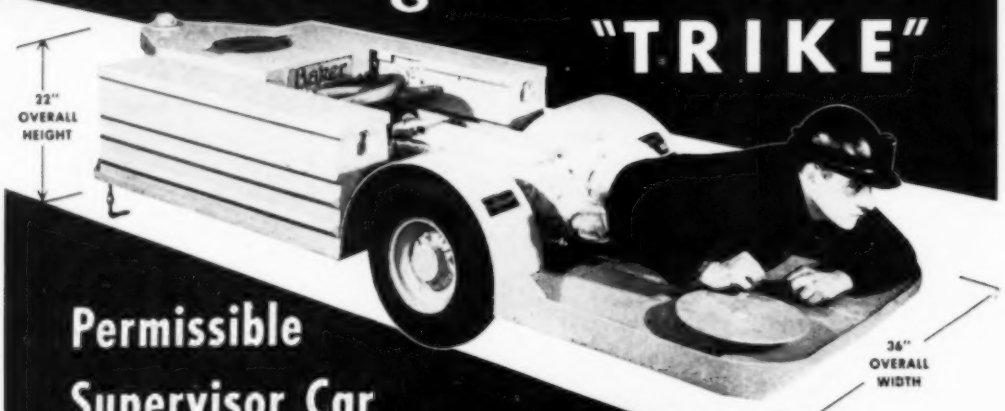
VALVES
FITTINGS
PIPE

CRANE

PLUMBING
AND
HEATING

FOR EVERY PIPING SYSTEM

Introducing the BAKER "TRIKE"



Permissible Supervisor Car For Low Seam Mines

SPECIFICATIONS

WEIGHT—1265 lbs. with battery.

CAPACITY—Will carry 500 lbs.

POWER UNIT—Battery will give approximately 5 miles of nomal travel. DC or AC charging equipment available to recharge battery in 8 hours. Spare battery will permit 2- or 3- shift service.

MOTOR DRIVE—Vehicle motor drives the two load-carrying wheels through a differential and chain reduction.

CONTROLS—One speed forward and reverse with contactor control, overload relay and fused circuit. Control lever operated by left hand; brake by right foot with prone operator, by left hand with seated operator.

STEER—Rear wheel steer permits Trike to spin about in 9 ft. entry.

CLEARANCE—22 inches overall height. Standard model 36 inches wide, two-man model 48 inches wide.

PERMISSIBLE—Built to Bureau of Mines Specifications and carries permissible plate.

2 PASSENGER MODEL

To solve the problem of personal transportation for supervisors, mechanics, fire-bosses, engineers and others who must travel in low seams with or without equipment, Baker offers the *"Trike"*—a light, maneuverable 3-wheel battery-powered car—driven from prone or sitting position. The overall height is only 22 inches, and the overall width 36 inches. It is operating successfully in wet, fireclay bottom, rolling seams and close timbering, and has ample power to negotiate grades of 20% or better. A two-passenger model is also available.

The *"Trike"* will increase the efficiency of any trackless low-seam mining operation by bringing key personnel quickly to the spot where needed.

See the entire new line of Baker battery-powered rubber-tired mining equipment—including Timbering Machines and Mine Tractors, and Fletcher Trailers, at the 1949 Coal Show of the American Mining Congress, Cleveland, May 9-12.

Manufactured by

THE BAKER-RAULANG CO.

1213 West 80th Street • • • Cleveland, Ohio

Exclusive Coal Mine Representatives

J. H. FLETCHER & CO.

Chicago, Illinois • • • Huntington, W. Virginia

Baker MINE EQUIPMENT

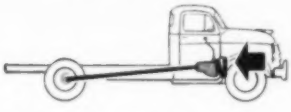
Here's what "Job-Rated" means to coal dealers...

the Right POWER

"*Job-Rated*" means your truck will have the right power.

For maximum performance, with economy, it will have the right one of 7 great Dodge truck engines. You save money on gas, oil, and upkeep.

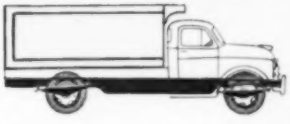
...the Right DRIVE LINE



"*Job-Rated*" means your truck will have the right driving units: Clutch, transmission, rear axle, gear ratio . . . and other load-*moving* units.

You get more efficient performance. Your truck stays *on the job*—longer.

...the Right LOAD SUPPORT



"*Job-Rated*" means the right support for your load. Frames, axles, springs, bodies, wheels and tires—all are the right size for the weight of your truck . . . and the load it hauls. Result: Your truck "stands up," and maintenance costs are low.

... in short, the Right truck to fit your job!

To get a "*Job-Rated*" truck, see your Dodge dealer.

Tell him three things: (1) The weight of your loads; (2) the type and size of body you need; (3) your grade and speed requirements.

From 248 basic chassis models, your Dodge dealer will specify a "*Job-Rated*" truck that fits your job. Every unit, from engine to rear axle, will be "*Job-Rated*" . . . engineered and built for your loads.

Such a truck will save you money . . . when you buy it, every mile you use it. And remember . . . only Dodge builds "*Job-Rated*" trucks!

FOR THE LOCATION OF YOUR DODGE DEALER, CONSULT YELLOW PAGES OF YOUR PHONE BOOK

DODGE
"Job-Rated" Trucks
FIT THE JOB . . . LAST LONGER

LIMA

SHOVELS, CRANES AND DRAGLINES...

Strip more

Dig more

Load more

(Left) LIMA Type 1201 Dragline with 95' boom removing overburden on stripping operation.

(Above) LIMA Type 802 Shovel with 24'-6" boom and 2 yard dipper with 18' handle loading highway truck.

(Left) LIMA Type 1201 Shovel with 42' boom, with 32' handle and 2½ yard dipper, removing rock, shale and clay from coal seam.

because they STAY ON THE JOB!

Breakdowns in mining operations are costly—not only because of difficult on-the-job maintenance, but also because of down time of expensive equipment and labor. That's why LIMA shovels, cranes and draglines, with extra "built-in" stamina for the rugged job of coal stripping and open cut mining, pay big dividends by assuring continuous operation with maximum output at lowest cost.

Sturdy unit-type construction, simple, rugged design, low center of gravity, long wide crawlers, permanent shaft alignment, smooth running anti-friction bearings, ample power for big output, big cable drums, air-operated clutches, large braking areas, and maximum use of properly selected heat-treated alloy steels—these are only a few features which help you *strip more, dig more* and *load more* with a LIMA.

Lima excavating equipment is setting new production records on coal stripping operations wherever used. Let a LIMA engineer estimate your requirements.

Lima Shovel and Crane Division

LIMA, OHIO

OTHER DIVISIONS: *Lima Locomotive Works Division; Niles Tool Works Co., Hooven, Owens, Rentschler Co.*

LIMA HAMILTON CORPORATION

AIRCO HARDFACING ALLOYS

add 2 to 25 times
LONGER SERVICE LIFE
to new and worn parts

SEVERE ABRASION

Pug mill knives, coke crusher rolls, mill guides and similar equipment, when hardfaced with Aircolite last many times longer, and at the same time give superior operating efficiency. For extreme earth abrasion, Airco Tungtube (tungsten carbide) is recommended.

IMPACT

Parts subjected to impact, like bucket lips, last longer when hardfaced with Airco Electric Self Hardening Alloy. Furthermore, parts can be rebuilt with this alloy at a fraction of new part cost. For shattering impact, Airco No. 388 is recommended.

HEAT and CORROSION

Aircoloy 1 and 6 effectively resist wear caused by heat and corrosion . . . for example, parts subject to intense heat, such as ingot tong bits, exhaust valves and seats, tap hole augers, and hot punches, last from 2 to 25 times longer when protected with these NEW Airco Hardfacing Alloys.

BUT TRY A FEW OF THESE NEW AIRCO HARDFACING ALLOYS YOURSELF . . . TAKE ADVANTAGE OF THE SPECIAL INTRODUCTORY LOW PRICE OFFER!

For Only $2.95 you receive a trial assortment of *Aircolite* (for oxy-acetylene and electric application) and Airco Electric Self Hardening Alloys, plus instruction sheets for each of these two alloys and a booklet describing the complete line of Airco Hardfacing Alloys.

Since this special price is good for a limited time only, we suggest that you fill in and mail the coupon below . . . NOW! Send it to our nearest office or authorized dealer. On West Coast: Air Reduction Pacific Company. Represented Internationally by Airco Corporation (International).

Mail this coupon today for your Special Assortment of the NEW AIRCO HARDFACING ALLOYS

Key
Air Reduction, 60 East 42nd Street, New York 17, N. Y.

☐ Here is my check for $2.95 — send me the special package of Airco's Hardfacing Alloys.

☐ Send me your booklet: "Airco Hardfacing Alloys" — at NO cost to me.

Firm _____

Signed By _____

Address _____

City & State _____

AIRCO AIR REDUCTION
Offices in All Principal Cities

Headquarters for Oxygen, Acetylene and Other Gases . . . Carbide . . . Gas Welding and Cutting Machines, Apparatus and Supplies . . . Arc Welders, Electrodes and Accessories

HERE'S A BIG EXPENSE YOU CAN CONTROL

Industrial Eye Accident Costs UP 78½%

OVER 1939 COSTS

In these days of rising costs when you put a "tracer of lost profits" on your books, you may see that it isn't only the rising costs of raw materials and labor that eat into your net! Eye accidents throughout industry average more than $5 *per employed shop worker* per year. You can avoid the unnecessary costs of eye accidents (sometimes represented by 4-figure claims) by installing an adequate eye protection program. Your MSA Representative can show you how 98% of all eye accidents can be prevented by such a plan and *how large your savings can be!*

American Optical COMPANY

Safety Division

Southbridge, Massachusetts • Offices in Principal Cities

America's Choice

CHEVROLET ADVANCE-DESIGN TRUCKS

for All-Around Value!

Ask the experts—

If you ask the drivers, they'll say:

"Chevrolet Advance-Design Trucks can and will take it day after day, month after month. They're easy to handle . . . built with driver safety and comfort in mind."

The mechanics insist:

"Chevrolet trucks last longer because they're designed, engineered and built for the job. They're easier to work on . . . built with an eye to economical maintenance."

The owners will tell you:

"Only Chevrolet has the TRIPLE ECONOMY of low cost operation . . . low cost upkeep . . . and the lowest prices in the entire truck field."

CHEVROLET MOTOR DIVISION, *General Motors Corporation*, DETROIT 2, MICHIGAN

Only the Leader — Chevrolet has all these features:

NEW CHEVROLET 4-SPEED SYNCHRO-MESH TRUCK TRANSMISSION

A special feature in one-ton and heavier duty models that assures new operating ease and efficiency.

THE CAB THAT "BREATHES"

Here are the trucks with the famous cab that "breathes"! Outside air is drawn in and used air is forced out! Heated in cold weather.*

FLEXI-MOUNTED CAB

Chevrolet's Advance-Design Cab is mounted on rubber, cushioned against road shocks, torsion and vibration.

IMPROVED VALVE-IN-HEAD ENGINE

The world's most economical engine for its size now has greater durability and operating efficiency.

SPLINED REAR AXLE HUB CONNECTION

Greater strength and durability in heavy-duty models with this exclusive Advance-Design feature.

PLUS Uniweld, all-steel cab construction • New, heavier springs • Full-floating hypoid rear axles on ¾-ton and heavier duty models • All-round visibility with rear corner windows* • Specially designed brakes • Hydrovac power brakes on two-ton models • Ball-bearing steering • Double-line pre-selective power shift in 2-speed axle at extra cost on two-ton models • Wide base wheels • Standard cab-to-axle-length dimensions • Multiple color options.

*Heating and ventilating system and rear corner windows with de luxe equipment optional at extra cost.

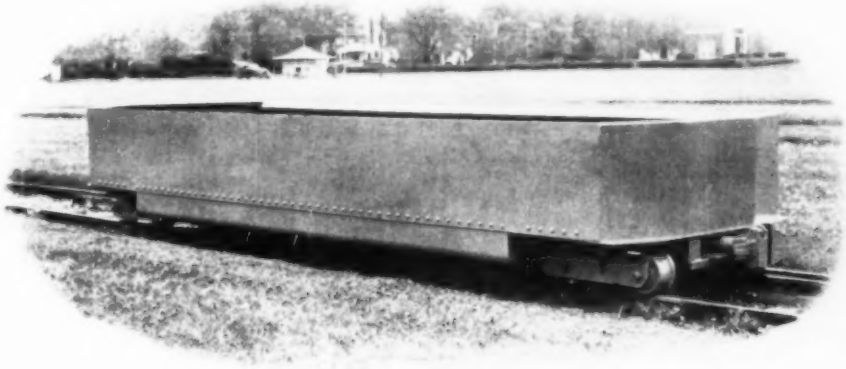
CHOOSE CHEVROLET TRUCKS FOR TRANSPORTATION UNLIMITED

CHEVROLET

Train of cars being rapidly dumped by means of Differential Rotary Car Dumper.

Train of Differential mine cars each with average load of 13 tons moves easily and speedily over the haulage roads.

One of the loading stations showing trip of cars being loaded by belt conveyor.



The Photographs on this page are of cars having a level load capacity of 395 cu. ft. each. Car has following dimensions: Length over end plates, 21' 6"; Width overall, 6' 6"; Height, 41" above rail. The car is equipped with AXLESS Trucks incorporating eight wheels, long easy spring action, and equalized wheel loading.

DIFFERENTIAL MINE CARS

FEATURE

UTMOST ROADABILITY
GREATEST CAPACITY WITHIN GIVEN DIMENSIONS
SIMPLE DESIGN FOR ECONOMY OF MAINTENANCE
RUGGED CONSTRUCTION FOR LONG LIFE
SUPERB WORKMANSHIP
DIFFERENTIAL CARS ARE SAFE

SEND FOR BULLETIN D-53

DIFFERENTIAL STEEL CAR COMPANY

FINDLAY, OHIO, U. S. A.

Builders of Haulage Equipment Since 1915

AIR DUMP CARS · MINE CARS · MINE LOCOMOTIVES · ROCK LARRIES · DUMPING DEVICES
BURDEN-BEARING LOCOMOTIVES · STOCKPILING CARS · COMPLETE HAULAGE SYSTEMS

SEARCHLIGHT SECTION

EMPLOYMENT • BUSINESS • OPPORTUNITIES • EQUIPMENT—USED or RELEASED

UNDISPLAYED RATE:
Not available for equipment advertising
90c a line. Minimum 4 lines. To figure advance payment count 5 average words as a line. (See ¶ on Box Numbers.)
POSITIONS WANTED (full or part-time individual salaried employment only), ½ the above rates.
PROPOSALS, 98 cents a line an insertion.

INFORMATION:
BOX NUMBERS in care of any of our New York, Chicago or San Francisco offices count 10 words additional in undisplayed ads.
DISCOUNT OF 10% if full payment is made in advance for four consecutive insertions of undisplayed ads (not including proposals).

DISPLAYED RATE
The advertising rate is $7.25 per inch for all advertising appearing on other than a contract basis. Contract rates quoted on request. AN ADVERTISING INCH is measured ⅞ inch vertically on one column, 3 columns—30 inches—to a page.
C.A.

NEW ADVERTISEMENTS received by 10 A.M. January 21st will appear in the February issue subject to limitations of space available.

WANTED

WANTED

¾ to 5 yard Shovels
2 to 10 yard Draglines
Tractors and Dozers

Frank Swabb Equipment Co., Inc.
Hazleton National Bank Building
Hazleton, Pa.
Telephones 4911 and 4918J

Just say:

"Information please"

whenever you need equipment or services not advertised in a particular issue of this magazine.

Each issue is only a part of the complete service we are organized and glad to render to reader and advertiser, alike. We want you to consider this publication your primary source of information in this field.

COAL AGE
330 West 42nd St., New York

TRANSFORMERS

FOR SALE

3	—	3	KVA	W-H 13200-120 240
12	—	5	KVA	W-H 13200-120 240
4	—	10	KVA	W-H 13200-120 240
1	—	15	KVA	W-H 13200-120 240
5	—	25	KVA	W-H 13200-120 240
3	—	25	KVA	Mol 13200-120 240
10	—	37½	KVA	W-H 13200-120 240
2	—	25	KVA	W-H 13200-2400
2	—	37½	KVA	Mol 13200-2400 4160Y
3	—	75	KVA	W-H 13200-120 240
3	—	75	KVA	G-E 13200-120 240
1	—	75	KVA	Mol 13200-2400
1	—	100	KVA	W-H 13200-2400
10	—	11½	KVA	Wag 7200-120 240 "REA"
2	—	5	KVA	G-E 4800-120 240
4	—	5	KVA	W-H 2400 4800-120 240
4	—	7½	KVA	W-H 4800 8320Y-120 240
1	—	25	KVA	Mol 2400 4800-120 240
3	—	50	KVA	W-H 4800 8320Y-120 240
3	—	50	KVA	G-E 26400 2300 4000Y
3	—	50	KVA	G-E 33000-2400 4160Y
3	—	100	KVA	G-E 33000 2400 4160Y
3	—	200	KVA	Pitts 26400 2300 4000Y

TRANSFORMERS

WANTED

Rewind and repair service on all makes of transformers.

THE ELECTRIC SERVICE CO.
Cincinnati 27, Ohio

WANTED

150 H.P. to 500 H.P. Double Drum Shaft Hoists.
100 H.P. to 700 H.P. Slope Hoists.
1,000 CFM to 5,000 CFM Electric Compressors.
150 or 200 KW Motor Generator Set with 250 volts DC Generator and 440 volt or 2,300 volt motor, controls.

BERRETTINI ELECTRIC CO.
376 N. Main Street, PLAINS, PA.

Wanted to Buy

Coal Mining Equipment for low vein coal.

PIONEER FUEL COMPANY
LATROBE, PENNA.

REPLIES Box No's. Mail to the nearest you.
NEW YORK: 330 W. 42nd St. 18th
CHICAGO: 520 N. Michigan Ave. 11th
SAN FRANCISCO: 68 Post St. 4th

SELLING OPPORTUNITY OFFERED

SALESMAN WANTED with industrial and domestic clientele to sell eastern Kentucky coals in Ohio and Michigan. In reply, state experience, territory sold and salary expected. Phoenix Fuel Company, 700 Starks Bldg., Louisville, Kentucky.

WANTED

ANYTHING within reason that is wanted in the field served by Coal Age can be quickly located through bringing it to the attention of thousands of men whose interest is assured because this is the business paper they read.

FOR SALE:
Joy Timber Setter

Type TS2 2PE, 250V, 18C Boom height 8', Serial No. TS-121. This machine was delivered in September and is as good as new.

FREEPORT GAS COAL CO.
1133 Terminal Tower Cleveland, Ohio
Phone: Main 3171

FOR SALE

Page 625S Diesel Walking Dragline, 140' boom, 9 yd. capacity, excellent condition. Being sold due to completion stripping this area. Located Northern West Virginia. Price $150,000.00 (includes $10,000.00 worth of parts, one 9 Yd. and one 8 Yd. bucket) delivered to R.R. spur.

Marion 492 electric 5 yd. coal-loading shovel, 32' boom, 22'3" sticks, equipped with 5 yd. welded coal dipper. Serial 8789, new Feb. 1948, can be seen operating at New Lexington, Ohio. Excellent condition. Price, $80,000.00 f.o.b. Cars.

SUNNYHILL COAL COMPANY
P. O. Box 7931
Pittsburgh 16, Pa.
Phone, Lehigh 1000

FOR SALE

2000-ft. # 4-3/ conductor 49-strands Neoprene jacketed Portable Cable with shielding over each conductor and ground wires, type SHD, for operation at 7,500-Volts or less, on 1,000-ft. reels, priced substantially below present market.

UNIVERSAL WIRE & CABLE CO.
EAstgate 7-4777
2662 Clybourn Avenue
Chicago 14, Illinois

COAL MINE EQUIPMENT FULLY RECONDITIONED

AIR COMPRESSORS
1—8¾ x 4¾ x 5 Pneumatic, 277 cu. ft. displacement. V-belted to a D-4400 Caterpillar Diesel Engine—Semi-portable.

BELT CONVEYORS
2—24", 15 to 75' Long, with Ding's Pulley.
1—30", 30' Long, with 2 H.P. Gearhead Motor. New belt.
1—30", 70' Long, with driving mechanism.
1—36", 50' Long, with driving mechanism.

FLIGHT CONVEYORS
1—8" Flight Conveyor—65' Long.
1—10" Flight Conveyor—30' Long.
2—24" Flight Conveyors—50' Long.
1—24" Flight Conveyor—85' Long.
1—30" Flight Conveyor—150' Long.

GENERATORS—DIESEL
3—D-13000 Caterpillar Diesel Generators, 75 KW, 440 Volts, A.C.
1—D-4400 Caterpillar, V-belted to 30 KVA AC Generator.

COAL CRUSHERS
1—26" American Ring Type.
1—24 x 20 Jeffrey Swing-Hammer Mill.

RAILS
10 Tons—16# Relaying Rail.
50 Tons—65# Relaying Rail.
15 Tons—40# Relaying Rail.
Plate Frog Switches—30# to 60#.

MAGNETIC PULLEYS
1—24" Dia. x 26" Face Stainless Steel Ding's, 5' 6" Centers. Complete with mechanism, charger and 1 HP. Gen. Elec. Gear Motor.

WAGON DRILLS
1—Ingersoll-Rand, with drifter, all on pneumatic tires, used about 6 months.
1—Sullivan #JW-6, with drifter, on steel wheels.

VIBRATING SCREENS
1—3' x 6' Single Surface Tylet-Niagara, V-belted to 5 HP. AC Motor.
1—3' x 6' Single Deck Plat-O, Flat Belt Drive to 2 HP. AC Motor.

STEEL TANKS
1—8'6" x 29'8" Steel Tank (Army Bolted Type) Open Top, Cap. 44,000 Gals.
1—6' x 18' Steel Horizontal Closed Tank.

MOTORS—AC
16—¼ HP. New Leland Single Phase Motors.
10—½ HP. New Leland Single Phase Motors.
8—¾ HP. New Leland Single Phase Motors.
2—1½ HP. New Leland Single Phase Motors.
2—2 HP. New Louis Allis 3 Phase Motors.
1—3 HP. New Leland 3 Phase Motor.
1—5 HP. New Leland 3 Phase Motor.
2—1½ HP. Used G.E. 3 Phase Motors.
1—2 HP. Used Wagner 3 Phase Motor.
9—5 HP. Used G.E. 3 Phase Motors.
3—10 HP. Used G.E. & West. 3 Phase Motors.
1—20 HP. Used West. 3 Phase Motor.
2—25 HP. Used G.E. 3 Phase Motors.
2—30 HP. Used G.E. 3 Phase Motors.
3—35 HP. Used G.E. 3 Phase Motors.
1—40 HP. Used Allis-Chalmers 3 Phase Motor.
1—50 HP. Used G.E. 3 Phase Motor.
1—75 HP. Used G.E. 2200 volt, 3 Phase Motor.

SLUSHER HOISTS
1—Ingersoll-Rand, 3 Drum, with direct connected 50 HP. AC. Motor, and 2—1½ Yd. Crescent Scrapers. Unit used about 60 days.

HOISTS
1—No. 22 Vulcan, with Man Cage, 30' Steel Headframe and 40 HP. Single Speed Elevator Type Motor, equipped with Solenoid Brake (Hoist purchased new in 1942).
1—Single Drum Gasoline Hoist, direct connected to 2⅝ x 4¼ Wisc. Gas Engine.
1—15 HP. Single Drum Hoist, direct geared to motor with controller and grids.

COAL CUTTERS
1—Sullivan CE-7 AC Short Wall, complete with Standard and Tip-turn Trucks, most machines with Power Cable. New Cutting Machine Parts.

COAL WASHING EQUIPMENT
2—Rheolaveur Launders, complete with Steel Supporting Frame.
1—60" Dia. Dividing Table, direct connected to 2 HP. DC. Motor.
1—Gallagher Auto. Sampler with adjustable stroke and direct connected to a 1/6 HP. Motor.
1—12' x 10' Steel Hopper Bin.
1—70' x 12' Dorr Thickener Tank, complete with mechanism.

LARRY CARS
1—Connelsville Larry Cars, Trolley Operated, 6 Ton Capacity.

TROLLEY LOCOMOTIVES
2—7½ Ton Goodmans, 36" Gauge, 250 Volt DC.

MINE FANS
1—8-H60 Jeffrey Aerodyne Exhausting Fan, with 75 HP. Motor—Purchased new in 1942.

PIT CARS
150—Card Iron Works R.B. Pit Cars, 36" Gauge.
1—Card Iron Works Rock Car, 90 Cu. Ft. Capacity.

MISCELLANEOUS EQUIPMENT
1—Kennedy-Otto Drill Press with 1 HP. Vertical Gear Motor.
1—5 HP. Hercules Gas Engine.
1—Ideal Hot Water Boiler, with Stoker and Radiation.
Ingersoll-Rand Cent. Motor Mounted Pumps from 1 HP. to 25 HP.
4" and 8" Deep Well Pumps.
3—6" Hydroseal Pumps.
1—8" Hydroseal Pump.

Write for Our Bulletin No. 9 and Utah List

FLORENCE
MACHINERY AND SUPPLY COMPANY

SUITE 904, EQUITABLE BUILDING **DENVER 2, COLORADO**

C. J. PARRISH, MGR.

Phone: Alpine 2803
Yards: Denver and Florence, Colorado

REBUILT EQUIPMENT—READY TO SHIP

AXIAL FLOW VENTILATING FANS

5—50" dia. 72½" long, 2 sets of propellers, 8 blades to each. Dim. of blade 14"x8½" curved m/f'd by International. Size 114, driven by 100 HP., 1750 rpm., 220/440 v. 3 ph. 60 cy. A.C. Motor.

6—14000 CFM Buffalo Forge Co., 3" stat. pres. 1800/1200 rpm. con. 15/4.5 HP., 1710/1150 rpm., 3 ph. 60 cy. G.E. A.C. Motor 220/440 v. all excl.

2—12000 CFM 3" stat. pres. Sturtevant with dir. con. 10/3 HP., 1775/1180 rpm., 220/440 v. West. CS. TEFC Motor.

1—7500 cfm Clarage with dir. con. 7½ hp., 1750 rpm., 3.3 hp at 1160 rpm., 220/440 v. 3 ph. 60 cy.

31—6000 cfm. Sturtevant Bulletin 512280 3" stat. pres. 7 blade, dir. con. 5/1.5 HP., 1765/1175 rpm., 220/440 v. 3 ph 60 cy. West. TEFC Motors.

2—5000 cfm Sturtevant 1.8 stat. pres. 4.2/1.25 HP., 1750/1150 rpm., 2 ph. 60 cy., 220/440 v. ball-bearing motors.

1—4000 cfm 3" stat. pres. Sturtevant Axial Flow vent fan dir. con. 4/1.2 HP., 1750/1150 rpm., 220/440 v., 3 ph. 60 cy. Tot. 40c. West. Motor.

HOISTS

1—Welen—2 drum 8600# per drum, each drum is 6" clr. with 630 ft. of ⅝" cable per drum can be increased to take 660'. 130 FPM per drum, driven by 25 HP. 1750 rpm. 230 V. D.C. Mtr

HOISTS or WINCHES

200—1¼-ton Hand Cranked ratio 27.1 thru an enclosed double reduction gear unit with 4 planetary gears mounted on steel plate complete with 48' of ⅝" cable, ratchet type brake, push button release.

CAR PULLERS

100—Brand New with ⅝" cable, 1½ and 2 ton A.C. or D.C. Motors.

LOCOMOTIVES

6 ton Atlas, 230 v. D.C.—36" gauge.

230 V. D.C. MAGNETIC STARTERS AND CONTROLLERS

450—New, 1 HP. Cutler Hammer across the line.
111—New, 1 HP. Cutler Hammer across the line.
30—New, 2 HP. Cutler Hammer across the line.
55—New, 5 HP. Cutler Hammer drip proof 2 step current limit OL and LV.
58—New 7½ HP. Cutler Hammer.
12—10/15 HP. 230 V. Westinghouse Magnetic Drip Proof Controllers. 2 steps acceleration thermal overload relay with stop, start and reset buttons.
9—New, 10/15 HP., 230 v. G.E.
10—New, 40 HP., 230 v. G.E. Magnetic.

PUMPS — with AC or DC Motors

Qua.	GPM	Head	Make
2	1300	277'	Worthington
2	1200	300	Worthington
2	1100	323	Worthington
2 New	1000	346	Worthington
1	1000	370	Worthington
2	900	365	Worthington
8	800	378	Worthington
2	800	150	Worthington
1	700	388	Worthington
2	600	182	Worthington
1	600	220	Dayton Dowd
2	600	393	Worthington
2	400	196	Worthington
1	332	202	Worthington

230 V. D.C. MOTORS

Qu.	HP	Make	Type	Speed
2	200	Reliance	1070T	400
1	150	Gen. Electric	RCP-36	1750
1	125	Westinghouse	SK-190	568
4	100	Reliance	1050T	400
2	100	Westinghouse	SK-188	640
1	100	Gen. Electric	RC-58	650
1	100	Westinghouse	SK	650
2	90	Westinghouse	SK-185	575
1	75	Westinghouse	SK-160	850
3 new	75	Cr. Wh.	TEFC	860
1	60	Westinghouse	SK-123	1750
1	60	Westinghouse	SK-153	850
2	50	Westinghouse	SK-143	850
1	35	Gen. Electric	DLC-202	700
2	35	Allis Chal.		1800
1	30	Allis Chal.		575
1	30	Westinghouse	SK-123	850

MOTOR GENERATOR SETS—250 V., D.C.

Motors: 220 440 or 2200 volts—3 phase 60 cycle.

No.	KW	Make	RPM
1	250	Westinghouse	1200
1	200	Westinghouse	720
1	200	Westinghouse	1200
1	100	Westinghouse	700
1	100	General Electric	900
1	100	Westinghouse	600
1	100	General Electric	1800
1	100	Reliance	580
1	100	Delco	1200
1	90	Westinghouse	600
1	75	Westinghouse	720
1	75	Westinghouse	1200
1	60	Westinghouse	1200
1 NEW	50	General Electric	1800
1	40	Westinghouse	900
1	30	Westinghouse	720

250 VOLT D.C. GENERATORS

No.	KW	Make	Type	RPM
1	250	Westinghouse		1200
1	200	Westinghouse	SK	900
1	110	Westinghouse	SK-190	700
1	100	Reliance	1050 T	580
1	100	Westinghouse	SK-185	720
1	100	Westinghouse	SK-190	720
1	100	Westinghouse	SK-180	900
1	100	Delco		1200
1	100	General Electric	RC-58	850
1	100	Westinghouse	SK	850
1	100	General Electric	RCP-36	2300
1	75	Allis Chalmers		850
1	75	Westinghouse	SK	1400
1	60	Westinghouse	SK	2100-1550
1	50	Westinghouse	SK-152	1160
1	50	Westinghouse	SK-180	900
1	50	General Electric	DLC-202	850
1	30	Westinghouse	SK-143	1160

SLIP RING MOTORS—3 PHASE 60 CYCLE

No.	H.P.	Make	RPM	Volts
1 NEW	400	Westinghouse	600	2200
1	250	Allis Chalmers	870	2200
1 NEW	200	General Electric	600	220/440
1	200	Westinghouse	1800	220/440
1	150	General Electric	1800	220/440
1	150	Westinghouse	1150	220/440
1	125	Westinghouse	860	2200/220/440
1	100	Westinghouse	720	2200/220/440
1	100	Triumph	580	550/220/440
1	75	General Electric	600	550/220/440
1	75	General Electric	720	220/440
1	75	General Electric	900	220/440
1	75	Westinghouse	1800	220/440
1	60	Westinghouse	900	220/440
1	60	General Electric	720	220/440
2	50	Westinghouse	870	220/440/2200

ENGINE GENERATOR SETS

10—NEW 1 kw 14.25 v. D.C. and 2 kw. 28.5 v. D.C. Homelite portable gas eng. Gen. sets. Can furnish lamps and batteries. Suitable for farms and camps.

3—5 kva. 120/210 v. 1 ph. 60 cy. White Diese'.

30—NEW 25 kva. West. 120/208 v. 1 and 3 ph. 60 cy. LeRoi GAS.

12—100 kw., 240/120 v. Delco 1200 rpm. dir. driven by 150 HP. Superior GBD 8 5¼"x7" 8 cyl. DIESEL.

1—125 kva. G.E. 220/440 v. 3 ph. 60 cy., dir. con. Skinner UNIFLOW Engine.

SPECIAL BARGAIN

100 KW. Diesel Engine Generator Sets

11—100 kw., 250 275 v. D.C. Drive Generators dir. con. to 150 HP., GBD-8, 5½x7, 8 cyl. Superior Diesel Engines, elec. starting with muffler, power panel and accessories. ALMOST NEW—ONLY USED AS SPARES.

BRAND NEW TURBO SET

Westinghouse Steam Turbine consisting of 200 kw. 220/440 v., 3 ph. 60 cy. 1200 rpm., 80% P.F. A.C. Generator 40 kw. 120 v. 1200 rpm. D.C. Exciter and Westinghouse Reduction Gear.—Non condensing. Send for Catalog.

SPECIAL BARGAIN AIR COMPRESSORS

5—240 CFM Westinghouse type 3 VS-23 3 cyl. vert., 150 lbs. pres. dir. con. to 50 HP., 220/440 or 2200 v. 3 ph. 60 cy. West. Slip Ring Motors, auto. Control. Can furnish D.C. Motors or Oil or Gasoline Engines if desired.

DUQUESNE ELECTRIC & MFG. CO., PITTSBURGH (6), PA.

Write for New Stocklist

Montrose — 5800

REBUILT MINING MACHINES

2—112 A. A. Goodman Universal, D.C.
3—112 G-3-A Goodman Universal, 220 v. A.C.
2—112 G-3 Goodman Universal, 220 v. A.C.
3—35 B Jeffries Machines, 250 v., D.C.
6—CE Sullivans Machines, A.C. & D.C.
1—7B Sullivans Machine, 250 v., D.C.

LOCOMOTIVES

2—6-Ton Goodman type 33, Ball Bearing.
1—8-Ton Goodman type 32, Ball Bearing.
2—5-Ton Goodman type 2600, Ball Bear'g.
1—6-Ton G. E., 42-inch gauge.
1—5-Ton Mancha Storage Battery Locomotive, 42-inch track gauge, height 43". Complete with Storage Battery and Charging Panel.
2—6-Ton Westinghouse, Ball Bearing.

LOADING MACHINES

2—8 B.U. Joy, 42 in. gauge on Cats., D.C.
3—5 B.U. Joy, 42 in. gauge on Cats., D.C.

THOMAS GILLESPIE & SON
State Rd. 67 — Bicknell, Ind.
Phones 179 and 140 L. and 149 K.

MOTOR GENERATORS

500 KW G.E. SYN. 275 V. 2300/4000 V. 3 PH. 60 CY. 900 RPM. SWITCHGEAR.

500 KW G.E. SYN. 575 V. 2300/4000 V. 3 PH. 60 CY. 900 RPM. SWITCHGEAR.

400 KW WEST. SYN. 575 V. 2300/4000 V. 3 PH. 60 CY. 720 RPM. SWITCHGEAR.

300 KW G.E. SYN. 275 V. 2300 V., 3 PH. 60 CY. 1200 RPM. SWITCHGEAR.

150 KW G.E. SYN. 275 V. 2300/4000 V. 3 PH. 60 CY. 1200 RPM. SWITCHGEAR

SYNCH. CONVERTER

300 KW G.E. 575 V. 6 PH. 60 CY. 1200 RPM. Pedestal Type. 2300/4000 V. TRANSFORMERS and SWITCHGEAR.

LOCOMOTIVES

30-T Jeffrey 250 V.MH-77 Mts. 48"-36" Ga.
20-T Jeffrey 250 V.MH-77 Mts. 48"-36" Ga.
13-T Jeffrey 250 V.MH-110Mts. 42"-32" Ga.
10-T Jeffrey 250 V.MH-110Mts. 42'-32" Ga.
8-T West 250 V. 906-C Mts. 44"-36" Ga.
6-T West. 250 V. 903-B Mts. 32"-22" Ga.
6-T G.E. 250 V.HM-701 Mts. 32"-24" Ga.

Each unit listed above is owned by us and is available now for immediate purchase.

WALLACE E. KIRK CO.

501 Grant Building — **Pittsburgh, Pa.**

FOR SALE

150 Steel Mine Cars—36" Gauge—38" High—End Dump—Goodman Short Wall Mining Machines—36" Gauge—Several Small Room Hoists.

These may be seen at No. 1 Mine of the

Vinton Coal & Coke Company
Vintondale, Penna.

HOIST FOR SALE

200 HP single drum 8' dia. x 3'6" long, complete with automatic electric controls and air operated post brake. Excellent condition and ruggedly constructed.

G. & W. H. Corson, Inc.
Plymouth Meeting, Pa.

BUY FROM STOCK

Caldwell 200 ton Horiz. Hydraulic Wheel Press.
Bradley 200# Helve Hammer (Motorized)
LeBlond 20"x30' 4 G.S. Engine Lathe.
Cincinnati 2# and 2½ High Power Horiz. Millers.
American 24" Motorized Crank Shaper.

ELECTRIC MOTORS—ALL SIZES

FALK MACHINERY COMPANY
18 Ward St., Rochester, N. Y. — Phone Main 6347

SEARCHLIGHT SECTION

250-VOLT BALL-BEARING LOCOMOTIVES

1—6-ton General Electric, Type HM-821
3—6-ton General Electric, Type HM-801
2—6-ton Westinghouse, Type 905-C
3—8-ton General Electric, Type HM-821
2—8-ton Goodman, Type 32-A-1-4-T
3—8-ton General Electric, Type HM-819
2—8-ton General Electric, Type HM-707
4—8-ton General Electric, Type HM-839

The above Locomotives are from 36" to 48" gauge. All are equipped with CY-21 motor-driven gathering reels and 500' of practically new cable. Can be inspected at our Warehouse.

CUTTING MACHINES

4—Goodman 112-CG-3A, 3 phase, 60 cycle, 220/440 volt, on self-propelled trucks, reel and cable, 7½' cutter bar.
2—Jeffrey 35-BB, 3 phase, 60 cycle, 220-440 volt, on self-propelled trucks, reel and cable.
2—7-AU Universal Sullivan Machines, late type, 250 volt, 42" gauge
3—29-L Jeffrey Bottom Cutters, 250 volt
1—29-C Jeffrey Permissible Top Cutter, 250 volt
4—24-B Jeffrey Longwalls, 250 volt, on self-propelled trucks, cable and reels
8—24-L Jeffrey Machines, 250 volt

LOADING MACHINES

2—L-400-B Jeffrey Loading Machines, 250 volt
4—12-BU Joy Loading Machines, 250 volt DC, all purchased new in 1946, used very little
3—8-BU Joy Loading Machines, 250 volt DC
2—260-B Goodman Loading Machines, permissible type, 250 volt DC
2—8H-460 Goodman Loading Machines, 250 volt DC, 42" gauge
1—11-BU Joy Loading Machine, 250 volt DC
5—No. 3 Myers-Whaley Loading Machines, 250 volt DC, 42" gauge
5—7-BU Joy Loading Machines, 220-440 volt AC
3—8-BU Joy Loading Machines on cats., 42" gauge, 220/440 volt AC

Frank J. Wolfe

We specialize in buying complete mines that are going out of business or from receivers in bankruptcy, administrators of estates, etc.

COAL MINE EQUIPMENT SALES COMPANY

306-307 BEASLEY BUILDING L.D. PHONE 14 TERRE HAUTE, INDIANA

MINE HOIST: All steel construction, single drum, 8' dia., 3,700 ft. 1½" rope, single line pull capacity 12,000 lbs. with herringbone gears to operate at a speed of 200 or 600 FPM; motor 400 H.P., 580 RPM, 3 phase, 60 cycle, 2,200 volt, complete with all control equipment. Can be seen like NEW. Located in California.

GOODRICH SUPER LONG LIFE CORD CONVEYOR BELT (NEW):
1—Piece 1054 ft.
1—Piece 1012 ft.
1—Piece 358 ft.
6 ply, 42 oz. duck, 7/32" top cover, 1/16" bottom cover, on original reels.
All NEW, NATURAL RUBBER, with or without mechanical parts.

TURBO GENERATOR: Curtis Steam Turbine driven Generator Unit, 600 KW, 5 stage, 200 lbs. steam pressure, 3,600 RPM, with condenser, General Electric Generator, 750 KVA 2,300 volt, 3 phase, 60 cycle, with exciter, piping, valves, etc.

PUMP: Worthington 40 H.P. steam driven Centrifugal Pump, 200 lbs. steam pressure, 3,550 RPM, with steam regulator. Complete in new condition.

DRAGLINE: 4 yd. capacity, 110' boom, 2,200 volt, A.C.

A. J. O'NEILL
Lansdowne Theatre Building
LANSDOWNE, PA.
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AIR COMPRESSORS:
12—Belted, 300, 678, 870, 1,000, 1,300 ft.
12—Diesel, 105, 315, 520, 676 & 1,000 ft.
6—Electric, 1,300, 1,500, 2,200, 5,000 ft.

CARS & LOCOMOTIVES:
8½ Ton Whitcomb Diesel-Elec. Locomotives.
10—30 ton cap. Gondolas.
3—50 ton cap. Flat Cars.
6—100-ton, 45-ton, 30-ton Diesel Locomotives.
50—20 yd. cap. Air Dump Cars.
6—10, 16, 20 & 30 ton Gas Locomotives.
150—8,000 & 10,000 gal. cap. Tank Cars.

ELECTRIC LOCOMOTIVES:
15—3, 5, 8 ton Battery & Trolley.

DIESEL GENERATORS:
12—100, 150, 180 & 480 K.W.

MINE LOADERS:
17—G09, Eimco 21, Conway 20, 50, 80 & 75 and Sullivan ML3.

STEEL TANKS:
30—8,000, 10,000 and 20,000 gallon capacity.
9—80,000 & 20,000 bbl. cap.

LARGE SHOVELS—DRAGLINES
1—17 Yd. Cap. Bucyrus Erie Elec. Shovel.
2—10 Yd. Cap. Marion Elec. Shovels.
1—8 Yd. Cap. Marion Elec. Shovel.
1—7 Yd. Cap. Marion Diesel Dragline.
1—6 Yd. Cap. B. E. Monighan Diesel Dragline.
1—3 Yd. Cap. Marion Elec. Shovel.
1—4 Yd. Cap. Marion Diesel Shovel.
5 Steam Shovels—3½, 5, 6 and 8 Yd.

R. C. STANHOPE, INC.
60 E. 42nd Street New York 17, N. Y.

FOR SALE
NARROW GAUGE EQUIPMENT

36" Gauge

1—20 ton Davenport Locomotive, steam-operated, 165# W.P. A.S.M.E. boiler.
3—12 ton Whitcomb Locomotives, gas.
46—4 yd. Koppel Quarry Cars.
14—5 yd. Koppel Dump Cars.

24" Gauge

1—4 ton Plymouth Locomotive, gas.
1—5 ton Whitcomb Locomotive, gas, Type 3-SP.
30—1 cu. yd. all steel Koppel Cars.

IRON & STEEL PRODUCTS, INC.
12424 S. Brainard Ave.
Chicago 33, Illinois
"ANYTHING containing IRON or STEEL"

1—14 Ton Jeffrey Locomotive, MH 110 Motors.
1—10 Ton Westinghouse Locomotive, 9076, 250 volt motors.
1—8 Ton General Electric, with HM839 Motors.
1—6 Ton General Electric with HM823 Motors.
1—22" dia. x 54" face, Herringbone gear driven slope hoist with 300 HP Motor.
1—60" dia. x 48" face Herringbone slope hoist with 300 HP Motor.
1—35R Jeffrey Short Wall Mining Machine.
1—35BB Jeffrey Short Wall Mining Machine, A.C.
2—8 BU Joy Loading Machines.
1—7 BU Joy Loading Machine.

We have other coal mining equipment.

TIPPINS MACHINERY CO.
PITTSBURGH 6, PA.

SPECIAL BARGAINS

Marion "Type 492" Crawler Electric Shovel 5-yd., new February, 1948. Condition like new.

Page Diesel Walker Type Dragline with 8 or 9-yd. Drag Buckets, 5 years old, excellent condition.

Above machines used on coal stripping work. Priced low for quick sale.

THE ACME EQUIPMENT CO.
14057 Schaefer Highway
Detroit, Michigan

FOR SALE

Carload of 60± rail and switches.

MID-CONTINENT COAL & COKE CO.
Sturgis, Kentucky

FOR SALE

One Lima 802 Shovel with 37' 6" boom, 2½ yard dipper, 1¾ yard dipper. Also Dragline attachments including 70' boom and 2¼ yard Page Bucket. Good condition. Also a good inventory of repair parts and cables for same.

WRITE BOX 216
NEW LEXINGTON, OHIO

MOTORS • GENERATORS
TRANSFORMERS
25 cy. 60 cy. D.C.

ALL VOLTAGES 1-1500 H.P.
NEW and REBUILT
BOUGHT and SOLD
ELECTRIC EQUIPMENT CO.
ROCHESTER 1, N.Y.

NEW and REBUILT
STORAGE BATTERY
LOCOMOTIVES
1½ to 10 Ton 13" to 56" Track Gauge
GREENSBURG MACHINE CO.
Greensburg, Pa.

While they last NEW
Model "JB4 Ingersoll Rand" rock drills—$150
2-Ton "Yale & Towne" screw gear chain hoists—$50
SHURTER LUMBER & PILING COMPANY
SAMSONVILLE, NEW YORK

FOR SALE

1—10 ton Jeffrey, 250 V. Locomotive, serial 3196, Inside wheels, 36" gauge. May be inspected at Springfield ±2 miles (formerly Lincoln), Nanty Glo, Pa. For further details write to

LINCOLN COAL COMPANY
17 Battery Place New York 4, N. Y.

"Opportunity" Advertising:
Think
"SEARCHLIGHT"
First

FOR SALE

BLOWERS

3 Jeffrey Room Blowers, type 61, complete with 15 HP, AC, 3/60/220/440 roll ball bearing motor.

CRUSHERS

1 Link Belt 36 x 60 double roll crusher, equipped with gear drive.

1 American Pulverizer Crusher, No. 1627, type AC, machine number AC2B, strokes from 26" down to 5/8".

1 McNally Pittsburg 36 x 54 single roll crusher.

HOISTS

1 Wellman Engineering Company, single drum hoist, 36" in diameter, 27" face, 1 5/16" between peaks, 55/8" flange, 11/8" rope, 850' per minute. Complete with a 100 HP Westinghouse motor, 7,200 volts, 3 phase, 60 cycle, 250 RPM, type HF, and GE automatic control, CR1821 for mine hoist service, 2,200 volts, 100 HP.

LOCOMOTIVES

1 6 ton Jeffrey locomotive, 32" gauge.

1 5 ton Jeffrey locomotive, 32" gauge.

1 4 ton Whitcomb battery locomotive, 36" gauge.

MINING MACHINES

1 Goodman Universal Mining Machine, 112AX, 10 ft. 6 in. cutter bar.

1 Goodman Universal Mining Machine, 112AX, 10 ft. 6 in. cutter bar.

1 Jeffrey Shortwall Mining Machine, 35-BB, AC, 6 cutter bar complete with tip turn truck, cable and reel.

1 Sullivan Shearing Machine, Class CH11, DC, 9' cutter bar.

2 Sullivan Longwall Mining Machines, type CH8, 3/60/220 volts, 20' cutter bars, complete with 200' each of 3 C mining machine cable.

MOTOR GENERATOR SETS

50 KW motor generator set, AC end 75 HP Westinghouse squirrel cage motor, type CS, 3 phase, 60 cycle, 220 volts, 1,140 rpm, #1458110, DC end, 50 HP Crocker Wheeler, type CCM, 250 volts, 275 amps, #74063, complete with control for AC end.

30 KW Westinghouse motor generator set, DC end 250 volts, 200 amps, #11, type S, field serial #627594, commutator, #11-IT-125B, 800 RPM, compound wound, AC end 75 HP Westinghouse induction motor, type CS, 3 phase, 60 cycle, 2,200 volts, 18.1 amps per terminal, 40° C temp. rise, 870 rpm, #1561186, complete with switchboard for DC end and compensator for AC end.

30 KW General Electric motor generator set, 254061, type BR, form C, I.S. 230670-20, 200 amps, 250 volts, 1,710 RPM, cont. 50°C, direct connected to 75 HP General Electric induction motor, type KT357-4 75 1800, Form B, 3 phase, 60 cycle, 220 volts, 124 amps, 1,750 rpm, #4352202, cont. 40°C, complete with manual switchboard and compensator.

100 KW Direct generator set, 250 volts DC, complete with switchboard.

PUMPS

1 Gould Centrifugal pump, 2" suction, 2" discharge, capacity 225 GPM, at 105' head, direct connected to 10 HP Westinghouse motor, 3/60/220/440 volts, 3,450 rpm, ball bearing, with magnetic starter.

1 Carter Centrifugal pump, model 1½, 1¼" suction, 1" discharge, direct connected to 15 HP GE motor, 3/60/220/440 volt, 3,480 rpm, ball bearing.

RAILS

Approximately 24 net tons new 30 lb. rails in 20 ft. lengths.

Approximately 20 net tons used 25 lb. rails as good as new.

TIPPLE

1 Steel tipple complete with shaker and concrete silos. Capacity 1,000 tons per day.

We are distributors for John A. Roebling's Sons Company wire rope and fittings.

GAVENDA BROTHERS, Inc.
CANTON, ILLINOIS

FOR SALE

4 Goodman Style G20B77 permissible Shaker Conveyors, latest type with 200 Ft. size 2 troughs, manual Type HAD duckbill and 20 HP Westinghouse AC motor, 3 phase, 60 cycle, 220 volt, 1160 RPM.

4 Sullivan Class 7B Cutting Machines, with 50 HP AC motor, 3 phase, 60 cycle, 220 volt, no. 1 Bowdil cutter bar and chain, 9 ft. long, 5" kerf.

4 Chicago Pneumatic Style 574-700 post mounted coal drills, 220 volt, 60 cycle, 3 phase, AC.

All of above to include usual accessories and guaranteed to be in A-1 condition. New in 1943.

KAISER COMPANY, INC.
Iron & Steel Division
Sunnyside, Utah

MINING EQUIPMENT

9 ton Westghs. 36" ga. battery type locomotives, new 1945.

45 ton Davenport diesel electric locomotive, new 1942.

80 ton Lima steam switching locomotive, new 1944.

1½ yd. Lima 701 diesel dragline, new 1942.

MISSISSIPPI VALLEY EQUIPMENT CO.
511 Locust St., St. Louis 1, Mo.

SUBSTATIONS

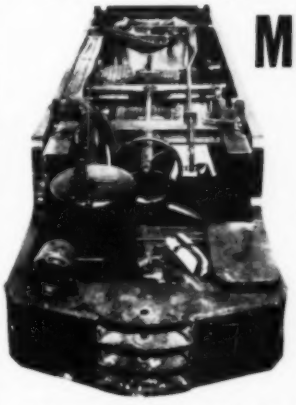
2—200 kw, 1,200 rpm., 250 volt DC, pedestal type G. E. Rotary Converters, with transformers and switchboards.

2—150 kw General Electric Synchronous Motor-Generator Sets, complete, 275 volts or 250-300 volts DC—2,300/4,000 volts AC, 3 phase, 60 cycle; 1,200 rpm. Type ATI Motor; Type MPC Generator.

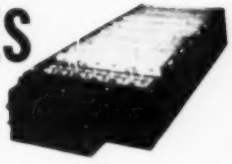
Also motors, transformers & control.

R. H. BENNEY EQUIPMENT CO.
5024 Montgomery Road
Norwood 12, Ohio

SAVE $4,000..... NEW WESTINGHOUSE



MINE LOCOMOTIVES



• IMMEDIATE DELIVERY •

Market Value $16,500

SPECIAL PRICE
$12,500
F.O.B., Columbus, Ohio

SPECIFICATIONS:

- WESTINGHOUSE, Battery Type, 10 Ton. Complete with 2 NEW PHILCO XV-29, 48 Cell Batteries.
- 36" Gauge. • Permissible Type. •Mfrd. in 1946-47.
- 55" high, 52⅛" wide, 14' 8" long—Overall Dimensions.
- Wheelbase 59". • 2 Motors of 22 HP each, 180 Volt.
- Draw Bar Pull 4,000 lbs. at 4.6 MPH.
- Outside Frame. • Extra Set of Mechanical Parts and Tools.

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WRITE OR WIRE TODAY TO:

ASSOCIATED TRADERS, INC.

255 Kalamath St., Denver, Colorado

COAL AGE ADVERTISERS IN THIS ISSUE

An asterisk preceding manufacturer's name indicates detailed information may be found in the 1947-48 MINING CATALOGS

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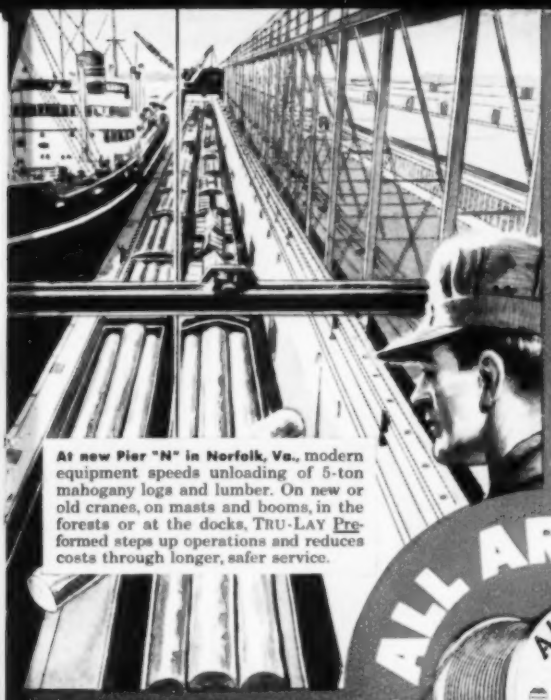
SEARCHLIGHT SECTION
(Classified Advertising)

ADVERTISERS INDEX



At new Pier "N" in Norfolk, Va., modern equipment speeds unloading of 5-ton mahogany logs and lumber. On new or old cranes, on masts and booms, in the forests or at the docks, TRU-LAY Preformed steps up operations and reduces costs through longer, safer service.

This cableway speeds construction of new sewage facilities for Philadelphia. Other cableways build dams, carry any materials over yawning chasms. Cableways use several types of top quality wire rope. TRU-LAY is made in constructions for maximum cableway efficiency.

ALL AROUND AMERICA

AMERICAN TRU-LAY PREFORMED CABLE

In a rolling mill in Baltimore, multi-ton machine parts are lifted with an overhead traveling crane, wire rope, and wire rope slings. TRU-LAY Preformed is the ideal rope for these powerful cranes, and ACCO Registered Wire Rope Slings provide the safe, connecting link.

Raising a jackknife derrick at Eunice, New Mexico. Cool skill and dependable wire rope do the job right. The same wire rope that lifts the drill pipe and casing is used for raising the derrick. A dual-purpose rope—that's TRU-LAY Preformed with improved plow steel wires.

ACCO

Wilkes-Barre, Pa., Atlanta, Chicago, Denver, Houston, Los Angeles, New York, Philadelphia, Pittsburgh, Portland, San Francisco, Seattle, Tacoma, Bridgeport, Conn.

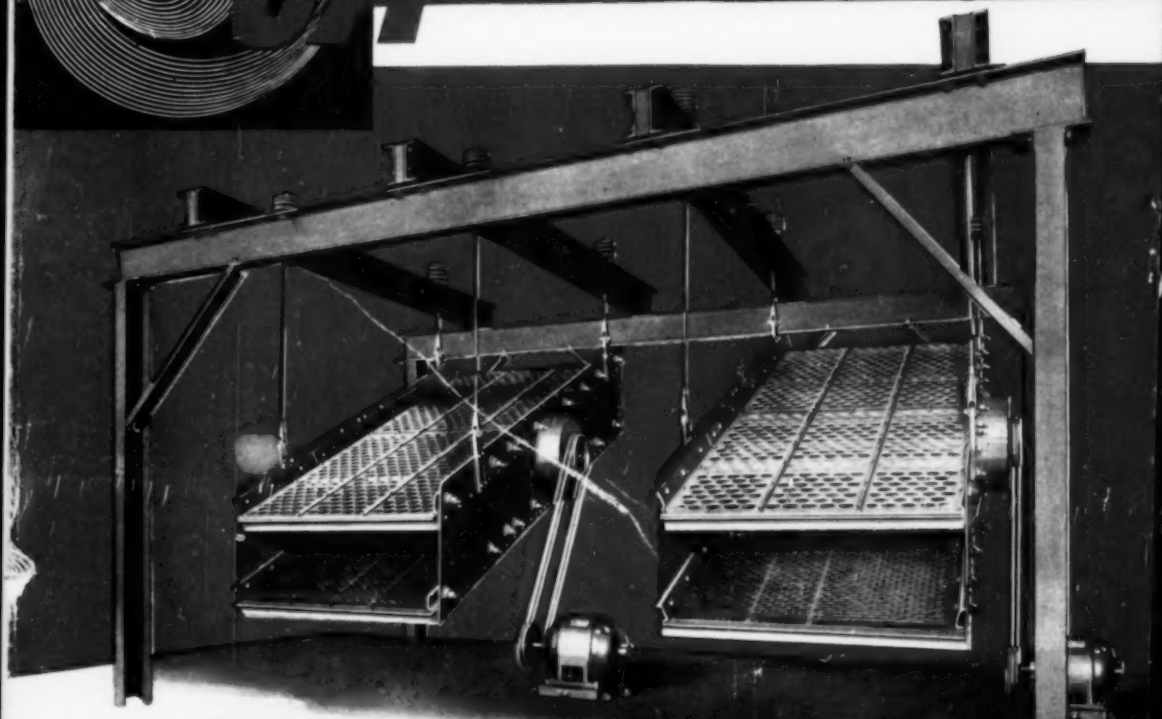
AMERICAN CABLE DIVISION
AMERICAN CHAIN & CABLE

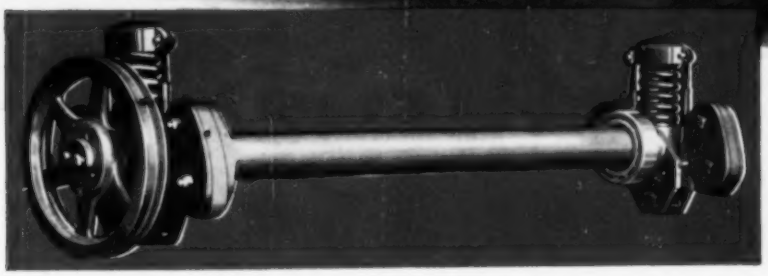
In Business for Your Safety

Tru-Lay *Preformed* **Wire Rope**

CA LINK-BELT

concentric action vibrating screen





Upper illustration shows dual double-deck "CA" cable suspended concentric action vibrating screens, with typical steel supporting structure. At left: "CA" screen vibrator mechanism showing details of centrifugally actuated counterweights.

THE heart of the "CA" screen is the Link-Belt two-bearing vibrator. Located near the center of gravity of the screen box, this ingenious and highly effective unit imparts a smooth, positive, circular motion to all screening surfaces.

Automatic centrifugally actuated counterweights eliminate objectionable vibrations usually encountered through "critical" speed ranges in accelerating and decelerating screens having fixed counterweights and large amplitudes of vibration. The high starting torques characteristic of fixed counterweights are substantially reduced by the automatic counterweight mechanism. Send for Book No. 2154.

LINK-BELT COMPANY Chicago 9, Philadelphia 40, Pittsburgh 13, Wilkes-Barre, Huntington, W. Va., Denver 2, Kansas City 6, Mo., Cleveland 13, Indianapolis 6, Detroit 4, St. Louis 1, Seattle 4, Toronto 8. 11,080

COAL PREPARATION AND HANDLING EQUIPMENT

Engineered, Built and Backed by LINK-BELT